ZPL II®

Programming Guide

Volume One: Command Reference for X.10

Zebra®

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INTRODUCTION
Volume One

Welcome to ZPL II Programming for X.10 Firmware

ZPL II Programming Guide Volume One: Command Reference for X.10 is designed for users who already have an understanding of how to create labels and formats using the Zebra Programming Language (ZPL II). *Volume One* is the unabridged, alphabetical reference of programming commands supported in the X.10 release of Zebra Printer firmware.

Note: This reference is designed somewhat differently than previous releases of the *ZPL II Programming Guide*. *Volume One* is specific for programming Zebra Printers using ***only the X.10 release of Zebra Printer firmware.*** The printer's firmware version can be determined by printing out a configuration label. Firmware upgrade information is also available at http://www.zebra.com.

If you are using a previous version of Zebra Printer firmware, you will find that some of the commands are the same and function as they have in the past – but equally as many are new and will not be recognized by firmware that is earlier than X.10. Other commands have been redesigned and significantly enhanced to support more powerful innovations like ZebraNet ALERT, and the Real Time Clock.

While many of the commands in this text have examples included to assist with proper ZPL II usage, these example are not designed to be a complete training reference. Users who are unfamiliar with ZPL II programming should refer to the *ZPL II Programming Guide Volume Two: The X.10 Environment* for information on how to get started with the language.

To provide more information and convenient cross-referencing, commands that are directly related to features discussed in *Volume Two* have been noted under their *Comments* heading, pointing to the appendix or section that applies.

If you are an experienced user of the ZPL II programming language, you may wish to browse this volume to reacquaint yourself with some of the commands and look for additions to those you already use.

For those unfamiliar with ZPL II, look through this volume and take note of some of the commands and the scope of what the language can do. Using these two volumes together will quickly bring you up to speed and have you creating dynamic labels in no time.

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ZPL II Programming Commands

Using Section One: ZPL II Command Reference

This section contains the complete alphabetical listing of ZPL II commands supported by the X.10 firmware release.

The text in Section One is arranged using the following headings and conventions:

Description: Under this heading you will find an explanation of how the command is used, what it is capable of, and any defining characteristics it may have.

Format: Format explains how the command is syntactically arranged and what parameters it contains. For example, examine the ^B8 command, which prints a EAN-8 bar code.

The *format* of this command is ^B8o,h,f,g. It is arranged with the caret symbol (^), the command code (B8), and the parameters (o,h,f, and g). Each of the letters that follow ^B8 – *o*,*h*,*f*, and *g* – are *parameters* and are replaced with supported values determined by the user.

Parameters: If a command has values that the user can define to make its function more specific, these are outlined as *parameters*. Parameters typically have *Accepted Values* and *Default Values*.

Still using the ^B8 example, the *h* parameter is defined as:

h = bar code height in dots
Accepted Values: 1 to 32000 (dots)
Default Value: Value set by ^BY

If the command has no parameters – for example ~JA (cancel all) – the parameter heading is removed, indicating that the format of the command (~JA) is acceptable ZPL II code.

Example: When the command is best clarified in context, an example of the ZPL II code is provided. Text indicating exact code entered by the user is printed in an easily recognizable Courier font. An example of code using the ^B8 command would look like this:

```
^XA
^FO50,50
^B8N,100,Y,N
^FD1234567^FS
^XZ
```

Notice that the ^B8 parameter letters have been replaced with real values that apply to the command. In this example, **`N, 100, Y, N`** have been entered.

Comments: This section is reserved for notes that are of value to a programmer, warnings of potential command interactions, or command-specific information that should be taken into consideration. An example comment could be: *This command only works when the printer is idle* or *This command is ignored if a value exceeds the parameter limits.*

Comments are also included next to parameters if they are directly applicable to a particular setting.

A complete listing of ZPL II commands for the X.10 firmware begins on page 6.

^A

Scalable/Bitmapped Font

Description: The ^A command is used with build-in or TrueType® fonts. ^A designates the font for the current ^FD statement or field. The font specified in ^A will be used *only once* for that ^FD entry. If ^A is not specified again, the default ^CF font will be used for the next ^FD entry.

Format: ^Af,o,h,w

Parameters:

f = font name
Accepted Values: letters A through Z, and numbers 1 to 9.
Default Value: A
Any font in the printer (downloaded, EPROM, stored fonts, font A through Z and 1 to 9) can also be selected with the ^CW command. If the value is incorrect or unspecified, it will revert to the default or the current ^CF value.

o = font orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: the last accepted ^FW value or the ^FW default.

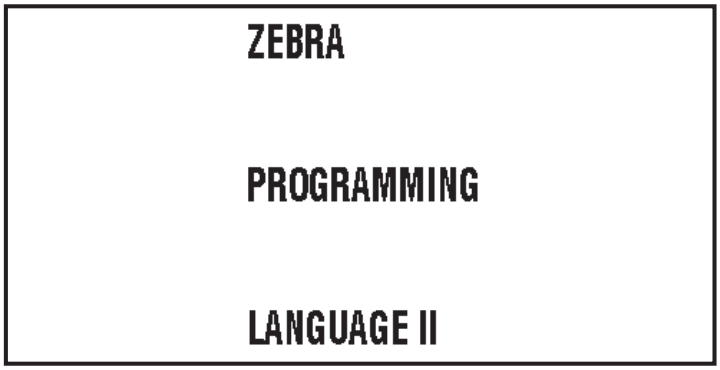
h = character height (in dots)
***Scalable*:**
Accepted Values: 10 to 32000
Default Value: 15, or the last accepted value for ^CF.
Bitmapped:
Accepted Values: Multiples of height from 2 to 10 times the standard height, in increments of 1.
Default Value: The standard matrix height for a specified font.

w = width (in dots)
Scalable:
Accepted Values: 10 to 32000
Default Value: 12, or last accepted value for ^CF.
Bitmapped:
Accepted Values: Multiples of width from 2 to 10 times the standard width, in increments of 1.
Default Value: The standard matrix width for a specified font.

Example:

Scalable Font Command

```
^XA
^FO50,50^A0,32,25^FDZEBRA^FS
^FO50,150^A0,32,25^FDPROGRAMMING^FS
^FO50,250^A0,32,25^FDLANGUAGE II^FS
^XZ
```



Bitmap Font Command

```
^XA
^FO50,50^ADN,36,20^FDZEBRA^FS
^FO50,100^ADN,36,20^FDPROGRAMMING^FS
^FO50,150^ADN,36,20^FDLANGUAGE II^FS
^XZ
```

Comments: Fonts are built using a matrix that defines standard height-to-width ratios. If you specify only the height or width value, the standard matrix for that font will automatically determine the other value. If the value is blank or a 0 (zero) is entered, the height or width will be determined by the standard font matrix.

For more information on scalable and bitmap fonts, refer to Appendix E or the section "Differences Between Download Scalable and Bitmap Fonts" in *Volume Two*.

^A@

Use Font Name to Call Font

Description: The ^A@ command uses the complete name of a font, rather than the character designation used in ^A. Once ^A@ is defined, it will represent that font until a new font name is specified by ^A@.

Format: ^A@o,h,w,n

Parameters:

o = font orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Last ^FW value or N if an orientation is not specified.

h = character height (in dots)
Default Value: Magnification specified by *w* (character width) or the last accepted ^CF value. The base height is used if none is specified.
Scalable: The value is the height in dots of the entire character block. Magnification factors are unnecessary, since characters are scaled.
Bitmapped: The value is rounded to nearest integer multiple of the font's base height, then divided by the font's base height to give a magnification nearest limit.

w = character width (in dots)
Default Value: Magnification specified by *h* (height) or the last accepted ^CF value. The base width is used if none is specified.
Scalable: The value is the width in dots of the entire character block. Magnification factors are unnecessary, since characters are scaled.
Bitmapped: The value is rounded to nearest integer multiple of the font's base width, then divided by the font's base width to give a magnification nearest limit.

n = font name (.FNT extension)
Accepted Values: any valid font (with the extension .FNT)
Default Value: If no letter designates the device location, the default device is RAM or R:. The font named will carry over on all subsequent ^A@ commands without a font name.

Example:

```
^XA^A@N,25,25,B:Cyrillic.FNT^FO100,20^FS
^FDThis is a test^FS
^A@N,50,50^FO200,40^FS
^FDThis string uses the B:Cyrillic.FNT^FS^XZ
```

The first line will search the non-volatile memory of the printer (e.g. B:) looking for the “Cyrillic.FNT” font name. When the font is found, the command will set the character size, the field origin, and print the field data “This is a test” on a label (line 2).

In the third command line, the character size is increased and a new field origin is set. Line 4 prints the field data “This string uses the B:Cyrillic.FNT” in the same font.

Comments: For more information on scalable and bitmap fonts, refer to Appendix E or the section “Differences Between Download Scalable and Bitmap Fonts” in *Volume Two*.

^B1

Code 11 Bar Code

Description: The ^B1 command is also known as USD-8 code. In a Code 11 bar code, each character is composed of three bars and two spaces, and the character set includes 10 digits plus a dash.

- ^B1 supports print ratios of 2.0:1 to 3.0:1.
- Field data (^FD) is limited to the width (or length, if rotated) of the label.

Format: ^B1o,e,h,f,g

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Current ^FW value

e = check digit
Accepted Values:
Y (yes) = 1 digit
N (no) = 2 digits
Default Value: N

h = bar code height (in dots)
Accepted Values: 1 to 32000
Default Value: Value set by ^BY

f = print interpretation line
Accepted Values: Y (yes) or N (no)
Default Value: Y

g = print interpretation line above code
Accepted Values: Y(yes) or N (no)
Default Value: N

Example:

```
^XA^FO100,100^BY3
^B1N,N,150,Y,N
^FD123456^XZ
```

Characters

0	1
2	3
4	5
6	7
8	9

Internal Start/Stop Characters

Δ

When used as a stop character

Δ is used with 1 check digit

Δ is used with 2 check digits

Comments: If additional information about the Code 11 Bar Code is required, refer to Appendix H in *Volume Two* for AIM, Inc. contact information.

^B2

Interleaved 2 of 5 Bar Code

Description: The ^B2 command is a high density, self-checking, continuous, numeric symbology.

Each data character for the Interleaved 2 of 5 Bar Code is composed of five elements: five bars or five spaces. Of the five elements, two are wide and three are narrow. The bar code is formed by interleaving characters formed with all spaces into characters formed with all bars.

- ^B2 supports print ratios of 2.0:1 to 3.0:1.
- Field data (^FD) is limited to the width (or length, if rotated) of the label.

Format: ^B2o,h,f,g,e

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Current ^FW value

h = bar code height (in dots)
Accepted Values: 1 to 32000
Default Value: Value set by ^BY

f = print interpretation line
Accepted Values: Y (yes) or N (no)
Default Value: Y

g = print interpretation line above code
Accepted Values: Y (yes) or N (no)
Default Value: N

e = calculate and print Mod 10 check digit
Accepted Values: Y (yes) or N (no)
Default Value: N

Example:

Interleaved 2 of 5 Characters

0	1
2	3
4	5
6	7
8	9

Start Stop (internal)

Comments: The total number of digits in an Interleaved Bar Code *must be even*. The printer automatically adds a leading 0 (zero) if an odd number of digits is received.

The Interleaved 2 of 5 bar code uses the Mod 10 check-digit scheme for error checking. For more information on Mod 10 check digits, refer to Appendix C in *Volume Two*.

If additional information about the Interleaved 2 of 5 bar code is required, refer to Appendix H in *Volume Two* for AIM, Inc. contact information.

^B3

Code 39 Bar Code

Description: The Code 39 bar code is the standard for many industries, including the U.S. Department of Defense (DOD). It is one of three symbologies identified in the American National Standards Institute (ANSI) standard MH10.8M-1983. Code 39 is also known as "USD-3 Code" and "3 of 9 Code."

Each character in a Code 39 bar code is composed of nine elements: five bars, four spaces, and an inter-character gap. Three of the nine elements are wide; the six remaining elements are narrow.

- ^B3 supports print ratios of 2.0:1 to 3.0:1.
- Field data (^FD) is limited to the width (or length, if rotated) of the label.
- Code 39 automatically generates the Start and Stop Character (*)
- Code 39 is capable of encoding the full 128-character ASCII set.

Format: ^B3o,e,h,f,g

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Current ^FW value

e = Mod-43 check digit
Accepted Values: Y (yes) or N (no)
Default Value: N

h = bar code height (in dots)
Accepted Values: 1 to 32000
Default Value: Value set by ^BY

f = print interpretation line
Accepted Values: Y (yes) or N (no)
Default Value: Y

g = print interpretation line above code
Accepted Values: Y (yes) or N (no)
Default Value: N

Example:

Code 39 Bar Code

```
^XA^FO100,75^BY3
^B3N,N,100,Y,N
^FD123ABC^XZ
```

Code 39 Characters

1	A	K	U	-
2	B	L	V	.
3	C	M	W	$
4	D	N	X	/
5	E	O	Y	+
6	F	P	Z	%
7	G	Q		
8	H	R		
9	I	S		
0	J	T		

Comments: Extended ASCII is a function of the scanner, not of the bar code. Your scanner must have Extended ASCII enabled in order for this feature to work. To turn on (enable) Extended ASCII in the Code 39, you must first encode "+$" in your ^FD statement. To disable Extended ASCII, you must encode "-$" in your ^FD statement.

For example, to encode a carriage return with line feed into a Code 39 bar code:

```
^XA^FO20,20^B3N^FDTEST+$$M$J-$^FS^XZ
```

If additional information about the Code 39 Bar Code is required, refer to Appendix H in *Volume Two* for AIM, Inc. contact information.

Full ASCII Mode for Code 39

Code 39 can generate the full 128-character ASCII set using paired characters as shown in Table A and Table B.

Table A: Code 39 Full ASCII Mode

ASCII	Code 39
SOH	$A
STX	$B
ETX	$C
EOT	$D
ENQ	$E
ACK	$F
BEL	$G
BS	$H
HT	$I
LF	$J
VT	$K
FF	$L
CR	$M
SO	$N
SI	$O
DLE	$P
DC1	$Q
DC2	$R
DC3	$S
DC4	$T
NAK	$U
SYN	$V
ETB	$W
CAN	$X
EM	$Y
SUB	$Z
ESC	%A
FS	%B
FS	%C
RS	%D
US	%E

ASCII	Code 39
SP	Space
!	/A
“	/B
#	/C
$	/D
%	/E
&	/F
‘	/G
(	/H
)	/I
*	/J
++	/K
‘	/L
-	-
.	.
/	/O
0	O
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
:	/Z
;	%F
<	%G
=	%H
>	%I
?	%J

Table B: Code 39 Full ASCII Mode

ASCII	Code 39
@	%V
A	A
B	B
C	C
D	D
E	E
F	F
G	G
H	H
I	I
J	J
K	K
L	L
M	M
N	N
O	O
P	P
Q	Q
R	R
S	S
T	T
U	U
V	V
W	W
X	X
Y	Y
Z	Z
[	%K
\	%L
]	%M
^	%N
_	%O

ASCII	Code 39
‘	%W
a	+A
b	+B
c	+C
d	+D
e	+E
f	+F
g	+G
h	+H
I	+I
j	+J
k	+K
l	+L
m	+M
n	+N
o	+O
p	+P
q	+Q
r	+R
s	+S
t	+T
u	+U
v	+V
w	+W
x	+X
y	+Y
z	+Z
{	%P
|	%Q
}	%R
~	%S
DEL	%T, %X

^B4

Code 49 Bar Code

Description: The ^B4 command is a multi-row, continuous, variable-length symbology capable of encoding the full 128-character ASCII set. It is ideally suited for applications where large amounts of data are required in a small space.

The code consists of two to eight rows. A row consists of a leading quiet zone, four symbol characters encoding eight code characters, a stop pattern, and a trailing quiet zone. Rows are separated by a separator bar with a height of one module. Each symbol character encodes two characters from a set of 49 code characters.

- ^B4 has a fixed print ratio.
- Rows can be scanned in any order.

Format: ^B4o,h,f,m

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Current ^FW value

h = height multiplier of individual rows
Accepted Values: 1 to height of label
Default Value: Value set by ^BY
This number multiplied by the module equals the height of the individual rows in dots. *1 is not a recommended value.*

f = print interpretation line
Accepted Values:
N = No line printed
A = Print interpretation line above code
B = Print interpretation line below code
Default Value: N
When code exceeds 2 rows, expect the interpretation line to extend beyond the right edge of the code.

m = starting mode

Accepted Values:

0 = Regular Alphanumeric Mode
1 = Multiple Read Alphanumeric
2 = Regular Numeric Mode
3 = Group Alphanumeric Mode
4 = Regular Alphanumeric Shift 1
5 = Regular Alphanumeric Shift 2
A = Automatic mode. The printer determines starting mode by analyzing field data.

Default Value: A

Example:

```
^XA^FO150,100^BY3
^B4N,20,A,A
^FD12345ABCDE^XZ
```

Comments: If additional information about the Code 49 Bar Code is required, refer to Appendix H in *Volume Two* for AIM, Inc. contact information.

Field Data Set	Unshifted Character Set	Shift 1 Character Set	Shift 2 Character Set
0	0	’	
1	1	ESC	;
2	2	FS	<
3	3	GS	=
4	4	RS	>
5	5	US	?
6	6	!	@
7	7	“	[
8	8	#	\
9	9	&	]
A	A	SOH	a
B	B	STX	b
C	C	ETX	c
D	D	EOT	d
E	E	ENQ	e
F	F	ACK	f
G	G	BEL	g
H	H	BS	h
I	I	HT	I
J	J	LF	j
K	K	VT	k
L	L	FF	l
M	M	CR	m
N	N	SO	n
O	O	SI	o
P	P	DLE	p
Q	Q	DC1	q
R	R	DC2	r
S	S	DC3	s
T	T	DC4	t
U	U	NAK	u
V	V	SYN	v
W	W	ETB	w
X	X	CAN	x
Y	Y	EM	y
Z	Z	SUB	z
-	-	(	_
.	.	)	‘
SPACE	SPACE	Null	DEL
$	$	*	{
/	/	,	|
++	++	:	}
%	%	reserved	~
< (Shift 1)			
> (Shift 2)			
: (N.A.)			
; (N.A.)			
? (N.A.)			
= (Numeric Shift)			

Code 49 Shift 1 and 2 Character Substitutions

Code 49 Field Data Character Set

The ^FD data sent to the printer when using starting modes 0 to 5 is based on the Code 49 Internal Character Set. This is shown in the first column of the Code 49 table on the previous page. The characters

: ; < = > ?

are special Code 49 control characters.

Valid field data must be supplied when using modes 0 to 5. Shifted characters are sent as a two-character sequence of a *shift character* followed by a *character in the unshifted character set*.

For example, to encode a lowercase "a," send a "Shift 2 (>)" followed by an uppercase "A." If interpretation line printing is selected, a lowercase "a" will print in the interpretation line. This will reflect what the output from the scanner will read. Code 49 uses uppercase alphanumeric characters only.

If an invalid sequence is detected, the Code 49 formatter will stop interpreting field data and print a symbol with the data up to the invalid sequence. The following are examples of invalid sequences:

- Terminating numeric mode with any characters other than 0 through 9 or a Numeric Space.
- Starting in Mode 4 (Regular Alphanumeric Shift 1) and the first field data character is not in the Shift 1 set.
- Starting in Mode 5 (Regular Alphanumeric Shift 2) and the first field data character is not in the Shift 2 set.
- Sending Shift 1 followed by a character not in the Shift 1 set.
- Sending Shift 2 followed by a character not in the Shift 2 set.
- Sending two Shift 1 or Shift 2 control characters.

Advantages of Using the Code 49 Automatic Mode

Using the default (automatic mode) completely eliminates the need for selecting the starting mode or manually performing character shifts. The automatic mode analyzes the incoming ASCII string, determines the proper mode, performs all character shifts, and compacts the data for maximum efficiency.

Numeric mode will only be selected or shifted when five or more continuous digits are found. Numeric packaging provides no space advantage for numeric strings consisting of fewer than eight characters.

^B7

PDF417 Bar Code

Description: The ^B7 command is a two-dimensional, multi-row, continuous stacked symbology. PDF417 is capable of encoding over 1,000 characters per bar code. It is ideally suited for applications where large amounts of information are required at the time the bar code is read.

The code consists of 3 to 90 stacked rows. Each row consists of start and stop patterns and symbol characters called "code-words." A "code-word" consists of four bars and four spaces. A three code-word minimum is required per row.

- PDF417 has a fixed print ratio.

Format: ^B7o,h,s,c,r,t

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Current ^FW value

h = bar code height for individual rows
Accepted Values: 1 to height of label
Default Value: Value set by ^BY
This number multiplied by the module equals the height of the individual rows in dots. *1 is not a recommended value.*

s = security level
Accepted Values: 1 to 8 (error detection *and* correction)
Default value: 0 (error detection only)
This determines the number of error detection and correction code-words to be generated for the symbol. The default level provides only error detection *without* correction. Increasing the security level adds increasing levels of error correction and increases the symbol size.

c = number of data columns to encode
Accepted Values: 1 to 30
Default Value: 1:2 (row-to-column aspect ratio)
The user can specify number of code-word columns given control over the width of the symbol.

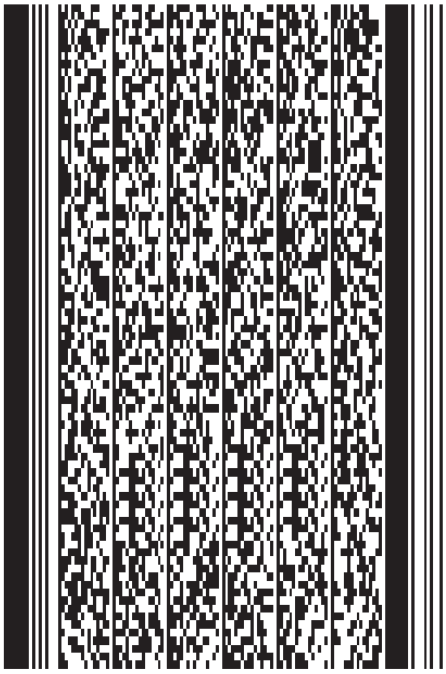
r = number of rows to encode
Accepted Values: 3 to 90
Default value: 1:2 row-to-column aspect ratio.
The user can specify the number of symbol rows giving control over the height of the symbol.
For example, with no row or column values entered, 72 code-words would be encoded into a symbol of 6 columns and 12 rows. Depending on code-words, the aspect ratio will not always be exact.

t = truncate right row indicators and stop pattern
Accepted Values: Y (perform truncation) and N (no truncation).
Default Value: N

Example 1:

The following code will generate the symbol shown below left. The text used in the ^FD statement is listed to the right of the bar code.

```
^XA^BY2,3
^FO10,10^B7N,5,5,,83,N
^FD[Text shown at right of bar code]^FS
^XZ
```



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Example 2:

PDF417 without Truncation being selected

PDF417 with Truncation being selected

Comments:

- If both columns and rows are specified, their product must be less than 928.
- No symbol is printed if the product of columns and rows is greater than 928.
- No symbol is printed if total code-words is greater than the product of columns and rows.
- Serialization is not allowed with this bar code.
- The truncation feature can be used in situations where label damage is not likely. The right row indicators and stop pattern will be reduced to a single module bar width. The difference between a non-truncated and a truncated bar code is shown in Example 2.

Special Considerations for ^BY When Using PDF417

When used with ^B7, the parameters for the ^BYw,r,t command are:

w = **module width.** Default = 2. Limited to 10.
r = **ratio.** Default = 3. Ratio is fixed and does not effect PDF417.
h = **height of bars (overall symbol height).** PDF417 uses this only when row height is not specified in the ^B7 *h* parameter.

Special Considerations for ^FD When Using PDF417

The character set sent to the printer includes the full ASCII set except for those characters with special meaning to the printer.

CR/LF have become valid characters for all ^FD statements. The following scheme will be used:

\& = carriage return/line feed
\(*) = soft hyphen (word break with a dash)
\\ = backslash (\)
(*) = Any alphanumeric character

- ^CI13 must be selected in order to print a backslash (\).
- If a soft hyphen is placed near the end of a line, the hyphen will be printed. If it is not placed near the end of the line, it will be ignored. This is ignored in the ^B7 bar code.

^B8

EAN-8 Bar Code

Description: The ^B8 command is the shortened version of the EAN-13 bar code. EAN is an acronym for European Article Numbering. Each character in the EAN-8 bar code is composed of four elements: two bars and two spaces.

- ^B8 supports a fixed ratio.
- Field data (^FD) is limited to exactly seven characters. ZPL II automatically pads or truncates on the left with zeros to achieve the required number of characters.
- When using JAN-8 (Japanese Article Numbering), a specialized application of EAN-8, the first two non-zero digits sent to the printer will always be 49.

Format: ^B8o,h,f,g

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Current ^FW value

h = bar code height (in dots)
Accepted Values: 1 to 32000
Default Value: Value set by ^BY

f = print interpretation line
Accepted Values: Y (yes) or N (no)
Default Value: Y

g = print interpretation line above code
Accepted Values: Y (yes) or N (no)
Default Value: N

Example:

EAN-8 Characters

0	1
2	3
4	5
6	7
8	9

Comments: If additional information about the EAN-8 Bar Code is required, refer to Appendix H in *Volume Two* for AIM, Inc. contact information.

^B9

UPC-E Bar Code

Description: The ^B9 command is a variation of the UPC symbology used for number system 0. It is a shortened version of the UPC-A bar code in which zeros are suppressed, resulting in codes that require less printing space. The 6 dot/mm, 12 dot/mm, and 24 dot/mm printheads produce the UPC/EAN symbologies at 100 percent of the size. However, an 8 dot/mm printhead will produce the UPC/EAN symbologies at a magnification factor of 77 percent.

Each character in a UPC-E bar code is composed of four elements: two bars and two spaces. The ^BY command must be used to specify the width of the narrow bar.

- ^B9 supports a fixed ratio.
- Field data (^FD) is limited to exactly 10 characters, requiring a five-digit manufacturer's code and five-digit product code.
- When using the zero-suppressed versions of UPC, the user must enter the full 10-character sequence. ZPL II will calculate and print the shortened version.

Format: ^Bo,h,f,g,e

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Current ^FW value

h = bar code height (in dots)
Accepted Values: 1 to 32000
Default Value: Value set by ^BY

f = print interpretation line
Accepted Values: Y (yes) or N (no)
Default Value: Y

g = print interpretation line above code
Accepted Values: Y (yes) or N (no)
Default Value: N

e = print check digit
Accepted Values: Y (yes) or N (no)
Default Value: Y

Example:

UPC-E Characters

0	1
2	3
4	5
6	7
8	9

Four Rules for Proper Product Numbers

1. If the last three digits in the manufacturer's number are 000, 100, or 200, valid Product Code numbers are 00000 to 00999.
2. If the last three digits in the manufacturer's number are 300, 400 , 500, 600, 700, 800, or 900, valid Product Code numbers are 00000 to 00099.
3. If the last two digits in the manufacturer's number are 10, 20, 30, 40 , 50, 60, 70, 80, or 90, valid Product Code numbers are 00000 to 00009.
4. If the manufacturer's number does not end in zero (0), valid Product Code numbers are 00005 to 00009.

Comments: If additional information about the UPC-E Bar Code is required, refer to Appendix H in *Volume Two* for AIM, Inc. contact information.

^BA

Code 93 Bar Code

Description: The ^BA command is a variable length, continuous symbology. It is used in many of the same applications as Code 39. It uses the full 128-character ASCII Code. ZPL II, however, does not support ASCII control codes or escape sequences. It uses the substitute characters shown below.

Control Code	ZPL II Substitute
Ctrl $	&
Ctrl %	‘
Ctrl /	(
Ctrl +	)

Each character in Code 93 Bar Code is composed of six elements: three bars and three spaces. Although invoked differently, the human-readable interpretation line will print as though the control code has been used.

- ^BA supports a fixed print ratio.
- Field data (^FD) is limited to the width (or length, if rotated) of the label.

Format: ^BAo,h,f,g,e

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Current ^FW value

h = bar code height (in dots)
Accepted Values: 1 to 32000
Default Value: Value set by ^BY

f = print interpretation line
Accepted Values: Y (yes) or N (no)
Default Value: Y

g = print interpretation line above code
Accepted Values: Y (yes) or N (no)
Default Value: N

e = print check digit
Accepted Values: Y (yes) or N (no)
Default Value: N

Example:

Code 93 Characters

1 2 3 4 5 6 7 8 9 0
A B C D E F G H I J K
L M N O P Q R S T U V
W X Y Z
- . $ / + % & ’ ( )
SPACE

Denotes an internal start/stop character that must precede and follow every bar code message.

Comments: All the control codes are used in pairs. For specific details, refer to the Code 93 specification.

Code 93 is also capable of encoding the full 128-character ASCII Set. See Tables A and B on the following pages.

If additional information about the Code 93 Bar Code is required, refer to Appendix H in *Volume Two* for AIM, Inc. contact information.

Full ASCII Mode for Code 93

Code 93 can generate the full 128-character ASCII Set using paired characters as shown in tables A and B.

Table A: Code 93 Full ASCII Mode

ASCII	Code 93
NUL	‘U
SOH	&A
STX	&B
ETX	&C
EOT	&D
ENQ	&E
ACK	&F
BEL	&G
BS	&H
HT	&I
LF	&J
VT	&K
FF	&L
CR	&M
SO	&N
SI	&O
DLE	&P
DC1	&Q
DC2	&R
DC3	&S
DC4	&T
NAK	&U
SYN	&V
ETB	&W
CAN	&X
EM	&Y
SUB	&Z
ESC	‘A
FS	‘B
FS	‘C
RS	‘D
US	‘E

ASCII	Code 93
SP	Space
!	(A
“	(B
#	(C
$	(D
%	(E
&	(F
‘	(G
(	(H
)	(I
*	(J
++	++
‘	(L
-	-
.	.
/	/
0	O
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
:	(Z
;	‘F
<	‘G
=	‘H
>	‘I
?	‘J

Table B: Code 93 Full ASCII Mode

ASCII	Code 93
@	‘V
A	A
B	B
C	C
D	D
E	E
F	F
G	G
H	H
I	I
J	J
K	K
L	L
M	M
N	N
O	O
P	P
Q	Q
R	R
S	S
T	T
U	U
V	V
W	W
X	X
Y	Y
Z	Z
[	‘K
\	‘L
]	‘M
^	‘N
_	‘O

ASCII	Code 93
‘	‘W
a	)A
b	)B
c	)C
d	)D
e	)E
f	)F
g	)G
h	)H
I	)I
j	)J
k	)K
l	)L
m	)M
n	)N
o	)O
p	)P
q	)Q
r	)R
s	)S
t	)T
u	)U
v	)V
w	)W
x	)X
y	)Y
z	)Z
{	‘P
|	‘Q
}	‘R
~	‘S
DEL	‘T

^BB

CODABLOCK Bar Code

Description: The ^BB command is a two-dimensional multi-row, stacked symbology. It is ideally suited for applications that require large amounts of information.

Depending on the mode selected, the code consists of 1 to 44 stacked rows. Each row begins and ends with a start/stop pattern.

- CODABLOCK A supports variable print ratios.
- CODABLOCK E and F support only fixed print ratios.

Format:^BBo,h,s,c,r,m

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: N

h = bar code height for individual rows (in dots)
Accepted Values: 2 to 32000
Default Value: 8
This number, multiplied by the module, equals the height of the individual row in dots.

s = security level
Accepted Values: Y (yes) or N (no)
Default Value: Y
This determines if symbol check-sums will be generated and added to the symbol. Check sums are never generated for single-row symbols. This can only be turned off if parameter *m* is set to *A*.

c = number of characters per row (data columns).
Accepted Values: 2 to 62 characters
This is used to encode a CODABLOCK Symbol. It gives the user control over the width of the symbol.

r = number of rows to encode

Accepted Values:

CODABLOCK A: 1 to 22
CODABLOCK E and F: 2 to 4

- If values for *c* and *r* are not specified, a single row will be produced.
- If a value for *r* is not specified, and *c* exceeds the maximum range, a single row equal to the field data length will be produced.
- If a value for *c* is not specified, the number of characters per row is derived by dividing the field data by the value of *r*.
- If both parameters are specified, the amount of field data must be less than the product of the specified parameters. If the field data exceeds the value of the product, either no symbol or an error code is printed (if ^CV is active).
- If the data field contains primarily numeric data, fewer than the specified rows may be printed. If the field data contains several shift and code switch characters, more than the specified number of rows may be printed.

m = mode

Accepted Values: A, E, F

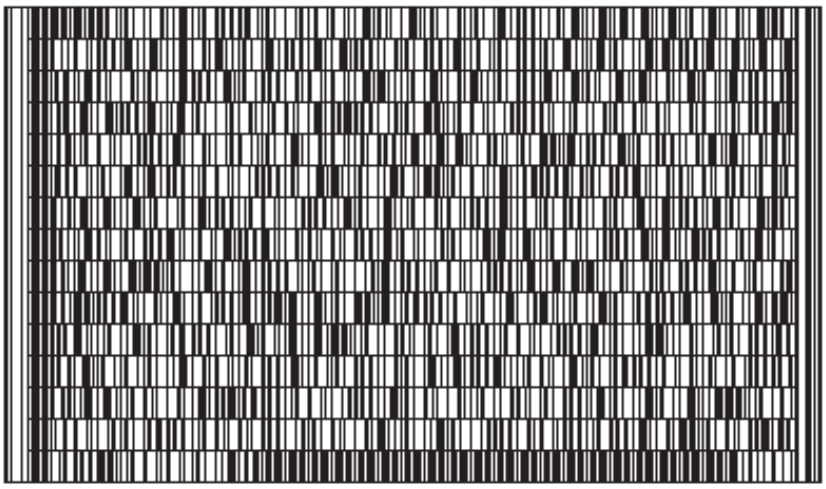
CODABLOCK A uses the Code 39 character set.
CODABLOCK F uses the Code 128 character set.
CODABLOCK E uses the Code 128 character set and automatically adds FNC1.

Default Value: F

Example:

The code below prints the following CODABLOCK bar code.

```
^XA^LH10,10^FS
^BY2,3^FO50,50^BBN,30,,30,44,E
^FD Zebra Technologies Corporation strives to be the
expert supplier of innovative solutions to specialty
demand labeling and ticketing problems of business
and government. We will attract and retain the best
people who will understand our customer's needs and
provide them with systems, hardware, software,
consumables, and service offering the best value,
high quality, and reliable performance, all delivered
in a timely manner.^FS
^XZ
```



Special Considerations for the ^BY Command When Using ^BB

The parameters for the ^BYw,r,h command, when used with a ^BB code, are as follows:

w = **Module width**. *Default Value*: 2 *Maximum Value:* 10. (CODABLOCK A only).

r = **Ratio**. *Default Value:* 3 (fixed value; this has no effect on CODABLOCK E or F).

h = Height of bars. CODABLOCK uses this as the overall symbol height only when the row height is not specified in the ^BB *h* parameter.

Special Considerations for ^FD Character Set When Using ^BB

The character set sent to the printer depends on the mode selected in parameter *m*.

CODABLOCK A: Uses the same character set as Code 39. If any other character is used in the ^FD statement, either no bar code is printed or an error message is printed (if ^CV is active).

CODABLOCK E: The automatic mode includes the full ASCII set except for those characters with special meaning to the printer. Function codes or the Code 128 subset A <nul> character can be inserted through the use of the ^FH command.

<fnc1> = 80 hex	<fnc3>= 82 hex
<fnc2> = 81 hex	<fnc4>= 83 hex
<nul>= 84 hex	

For any other character above 84 hex, either no bar code is printed or an error message is printed (if ^CV is active).

CODABLOCK F: Uses the full ASCII set except for those characters with special meaning to the printer. Function codes or the Code 128 subset A <nul> character can be inserted through the use of the ^FH command.

<fnc1> = 80 hex	<fnc3>= 82 hex
<fnc2>= 81 hex	<fnc4>= 83 hex
<nul>= 84 hex	

Comments: If additional information about the CODABLOCK Bar Code is required, refer to Appendix H in *Volume Two* for AIM, Inc. contact information.

^BC

Code 128 Bar Code (Subsets A, B, and C)

Description: The ^BC command is a high-density, variable length, continuous, alphanumeric symbology. It was designed for complexly encoded product identification.

Code 128 has three subsets of characters. There are 106 encoded printing characters in each set, and each character can have up to three different meanings, depending on the character subset being used. Each Code 128 character consists of six elements: three bars and three spaces.

- ^BC supports a fixed print ratio.
- Field data (^FD) is limited to the width (or length, if rotated) of the label.

Format: ^BCo,h,f,g,e,m

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Current ^FW value

h = bar code height (in dots)
Accepted Values: 1 to 32000
Default Value: Value set by ^BY

f = print interpretation line
Accepted Values: Y (yes) or N (no)
Default Value: Y
The interpretation line can be printed in any font by placing the font command before the bar code command.

g = print interpretation line above code
Accepted Values: Y (yes) or N (no)
Default Value: N

e = UCC check digit
Accepted Values: Y (yes) or N (no)
Default Value: N

m = mode

Accepted Values:

N – no selected mode

U – UCC Case Mode

A – Automatic Mode. This analyzes the data sent and automatically determines the best packing method. The full ASCII character set can be used in the ^FD statement. The printer will determine when to shift subsets. A string of four or more numeric digits will cause an automatic shift to subset C.

Default Value: N

Example:

```
^XA^FO100,100^BY3
^BCN,100,Y,N,N
^FD123456^XZ
```

Comments: If additional information about the Code 128 bar code is required, refer to Appendix H in *Volume Two* for AIM, Inc. contact information.

The following tables represent the **Code 128 Character Sets**.

Value	Code A	Code B	Code C
0	SP	SP	00
1	!	!	01
2	"	"	02
3	#	#	03
4	$	$	04
5	%	%	05
6	&	&	06
7	'	'	07
8	(	(	08
9	)	)	09
10	*	*	10
11	++	++	11
12	,	,	12
13	-	-	13
14	.	.	14
15	/	/	15
16	0	0	16
17	1	1	17
18	2	2	18
19	3	3	19
20	4	4	20
21	5	5	21
22	6	6	22
23	7	7	23
24	8	8	24
25	9	9	25
26	:	:	26
27	;	;	27
28	<	<	28
29	=	=	29
30	>	>	30
31	?	?	31
32	@	@	32
33	A	A	33
34	B	B	34
35	C	C	35
36	D	D	36
37	E	E	37
38	F	F	38
39	G	G	39
40	H	H	40
41	I	I	41
42	J	J	42
43	K	K	43
44	L	L	44
45	M	M	45
46	N	N	46
47	O	O	47
48	P	P	48
49	Q	Q	49
50	R	R	50
51	S	S	51
52	T	T	52
53	U	U	53
54	V	V	54
55	W	W	55
56	X	X	56
57	Y	Y	57
58	Z	Z	58
59	[	[	59
60	\	\	60
61	]	]	61
62	^	^	62
63	_	_	63
64	NUL	.	64
65	SOH	a	65
66	STX	b	66
67	ETX	c	67
68	EOT	d	68
69	ENQ	e	69
70	ACK	f	70
71	BEL	g	71
72	BS	h	72
73	HT	i	73
74	LF	j	74
75	VT	k	75
76	FF	l	76
77	CR	m	77
78	SO	n	78
79	SI	o	79
80	DLE	p	80
81	DC1	q	81
82	DC2	r	82
83	DC3	s	83
84	DC4	t	84
85	NAK	u	85
86	SYN	v	86
87	ETB	w	87
88	CAN	x	88
89	EM	y	89
90	SUB	z	90
91	ESC	{	91
92	FS	|	92
93	GS	}	93
94	RS	~	94
95	US	DEL	95
96	FNC3	FNC3	96
97	FNC2	FNC2	97
98	SHIFT	SHIFT	98
99	Code C	Code C	99
100	Code B	FNC4	Code B
101	FNC4	Code A	Code A
102	FNC1	FNC1	FNC1
103		*START (Code A)*	
104		*START (Code B)*	
105		*START (Code C)*	

Special Conditions if UCC Case Mode is Selected

1. More than 19 digits in ^FD or ^SN will be eliminated.
2. Fewer than 19 digits in ^FD or ^SN will add zeros to the right to bring count to 19. This produces an invalid interpretation line.

Code 128 Subsets

The three Code 128 character subsets are referred to as Subset A, Subset B, and Subset C. A subset may be selected in one of two ways:

1. A special Invocation Code can be included in the field data (^FD) string associated with that bar code.
2. Place the desired Start Code at the beginning of the field data. If no Start Code is entered, Subset B will be used.

To change subsets within a bar code, place the appropriate Invocation Code at the appropriate points within the field data string. The new subset will stay in effect until changed with appropriate Invocation Code. For example, in Subset C, “>7” in the field data changes the Subset to A.

The table below shows the Code 128 Invocation Codes and Start Characters for the three subsets.

Invocation Code	Decimal Value	Subset A Character	Subset B Character	Subset C Character
><	62			
>0	30	>	>	
>=	94		~	
>1	95	USQ	DEL	
>2	96	FNC 3	FNC 3	
>3	97	FNC 2	FNC 2	
>4	98	SHIFT	SHIFT	
>5	99	CODE C	CODE C	
>6	100	CODE B	FNC 4	CODE B
>7	101	FNC 4	CODE A	CODE A
>8	102	FNC 1	FNC 1	FNC 1
Start Characters				
>9	103	Start Code A	(Numeric Pairs give Alpha/Numerics)	
>:	104	Start Code B	(Normal Alpha/Numeric)	

Code 128 Invocation Characters

Example of Code 128 – Subset B

Since Code 128 Subset B is the most commonly used subset, ZPL II defaults to Subset B if no start character is specified in the data string. This is illustrated in the following two samples.

The bar codes in the following two samples are identical.

Figure A: Subset B with no start character

Figure B: Subset B with start character

The first two commands (^XA^FO100,75) start the label format and set the field origin (from the upper-left corner) where the bar code field begins – 100 dots across the x-axis and 75 dots down the y-axis.

The third command (^BCN,100,Y,N,N) calls for a Code 128 bar code to be printed with no rotation and a height of 100 dots.

Command four (^FDCODE128 in Figure A) and (^FD>:CODE128 in Figure B) specify the content of the bar code.

Command five (^XZ) indicates the end of the print field and the end of the label format.

The interpretation line will print below the code with the UCC check digit turned off.

The ^FD command for Figure A does not specify any subset, so Subset B is used. In Figure B , the ^FD command specifically calls Subset B. Although ZPL II defaults to Code B, it is a very good practice to include the invocation codes in the command.

Code 128 – Subset B is programmed directly as ASCII text, except for values greater than 94 decimal and a few special characters:

^ > ~

These characters must be programmed using the invocation codes.

Example of Code 128 – Subsets A and C

Code 128, Subsets A and C are programmed as pairs of digits, 00-99, in the field data string (refer to the Code 128 character chart on page 40).

In Subset A, each pair of digits results in a single character being encoded in the bar code; in Subset C, they are printed as entered. Figure E below is an example of Subset A. (The ">9" is the Start Code for Subset A.)

Non-integers programmed as the first character of a digit pair (D2) are ignored. However, non-integers programmed as the second character of a digit pair (2D) invalidate the entire digit pair, and the pair is ignored. An extra unpaired digit in the field data string just before a code shift is also ignored.

Figure C and Figure D below are examples of Subset C. Notice that the bar codes in the figures are identical. In the program code for Figure D, the "D" is ignored and the 2 is paired with the 4.

Figure C: Subset C, Normal Data

Figure D: Subset C, ignoring the Alpha character

Figure E: Subset A

^BD

UPS MaxiCode Bar Code

Description: The ^BD command creates a two-dimensional, optically read (not scanned) code. This symbology was developed by UPS (United Parcel Service).

The code is generated from the information in the ^FD statement which is described below. Notice that there are no additional parameters for this code and it does not generate an interpretation line. The ^BY command has no affect on the UPS MaxiCode Bar Code. However, the ^CV command does work.

Format: ^BDm,n,t

Parameters:

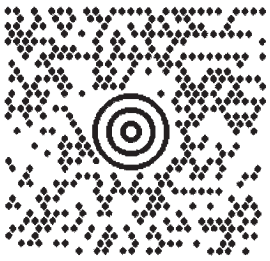
m = mode
Accepted Values:
2 – Structured carrier message: numeric postal code (U.S.)
3 – Structured carrier message: alphanumeric postal code (Non-U.S.)
4 – Standard symbol, secretary
5 – Full EEC
6 – Reader program, secretary
Default Value: 2

n = symbol number
Accepted Values: 1 to 8 may be added in a structured document.
Default Value: 1

t = total number of symbols
Accepted Values: 1 to 8, representing the total number of symbols in this sequence.
Default Value: 1

Example:

```
^XA
^FO50,50
^CVY
^BD^FH^FD001840152382802[)>_1E01_1D961Z00004951_1DUPS
N_1D_06X610_1D
159_1D1234567_1D1/1_1D_1DY_1D
634 ALPHA DR_1DPITTSBURGH_1DPA_1E_04^FS
^FO30,300^A0,30,30^FDMode2^FS
^XZ
```



Mode2

Special Considerations for ^FD when Using ^BD

The ^FD statement is divided into two parts: a High Priority Message (hpm) and a Low Priority Message (lpm). There are two types of High Priority Messages. One is for a U.S. Style Postal Code; the other is for a Non-U.S. Style Postal Code. The syntax for either of these High Priority Messages must be exactly as shown or an error message will be generated.

Format: ^FD <hpm><lpm>

Parameters:

<hpm> = high priority message (only applicable in Modes 2 and 3)
Accepted Values: 0 through 9, except where noted.

U.S. Style Postal Code (Mode 2)
<hpm> = aaabbbccccddddd
aaa = three-digit class of service
bbb = three-digit country zip code
ccccc = five-digit zip code
dddd = four-digit zip code extension. If none exists, four zeros must be entered (0000).

Non-U.S. Style Postal Code (Mode 3)
<hpm> = aaabbbcccccc
aaa = three-digit class of service
bbb = three-digit country zip code
ccccc = six-digit zip code (0-9 or A-Z)

<lpm> = **low priority message (only applicable in Modes 2 and 3)**
Gs is used to separate fields in a message (0x1D). Rs is used to separate format types (0x1E). Eot is the *end of transmission* character.

Message Header	]>Rs
Transportation Data	
Format Header	01Gs96
Tracking Number*	<tracking number>
SCAC*	Gs<SCAC>
UPS Shipper Number	Gs<shipper number>
Julian Day of Pickup	Gs<day of pickup>
Shipment ID Number	Gs<shipment ID number>
Package n/x	Gs<n/x>
Package Weight	Gs<weight>
Address Validation	Gs<validation>
Ship to Street Address	Gs<street address>
Ship to City	Gs<city>
Ship to State	Gs<state>
Rs	Rs
End of Message	Eot

(* Mandatory Data for UPS)

Comments:

- The formatting of <hpm> and <lpm> only apply when using Modes 2 and 3. Mode 4, for example, will take whatever data is defined in the ^FD command and place it in the symbol.
- UPS requires that certain data be present in a defined manner. When formatting MaxiCode data for UPS, always use uppercase characters. When filling in the "fields" in the <lpm> for UPS, follow the data size and types as specified in *Guide to Bar Coding with UPS*.
- If you do not choose a mode, the default mode will be Mode 2. If you use non-U.S. postal codes, you will probably get an error message (invalid character or message too short). When using non-U.S. codes, use mode 3.
- ZPL doesn't automatically change your mode based on the zip code format.
- When using special characters, such as Gs, Rs, or Eot, use the ^FH command to tell ZPL to use the hexadecimal value following the underscore character (_).

^BE

EAN-13 Bar Code

Description: The ^BE command is similar to the UPC-A bar code. It is widely used throughout Europe and Japan in the retail marketplace.

The EAN-13 bar code has 12 data characters, one more data character than the UPC-A code. An EAN-13 symbol contains the same number of bars as the UPC-A, but encodes a 13th digit into a parity pattern of the left-hand six digits. This 13th digit, in combination with the 12th digit, represents a country code.

- ^BE supports fixed print ratios.
- Field data (^FD) is limited to exactly 12 characters. ZPL II automatically truncates or pads on the left with zeros to achieve the required number of characters.
- When using JAN-13 (Japanese Article Numbering), a specialized application of EAN-13, the first two non-zero digits sent to the printer will always be 49.

Format: ^BEo,h,f,g

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Current ^FW value

h = bar code height (in dots)
Accepted Values: 1 to 32000
Default Value: Value set by ^BY

f = print interpretation line
Accepted Values: Y (yes) or N (no)
Default Value: Y

g = print interpretation line above code
Accepted Values: Y (yes) or N (no)
Default Value: N

e = print check digit
Accepted Values: Y (yes) or N (no)
Default Value: N

Example:

UPC/EAN Characters	
0	1
2	3
4	5
6	7
8	9

Comments: The EAN-13 bar code uses the Mod 10 check-digit scheme for error checking. For more information on Mod 10, refer to Appendix C in *Volume Two*.

If additional information about the EAN-13 bar code is required, refer to Appendix H in *Volume Two* for AIM, Inc. contact information

^BF

Micro-PDF417 Bar Code

Description: The ^BF command is a two-dimensional, multi-row, continuous, stacked symbology identical to PDF417, except it replaces the 17-module-wide start/stop patterns and left/right row indicators with a unique set of 10-module-wide row address patterns designed to reduce overall symbol width and to allow linear scanning at row heights as low as 2X.

Micro PDF417 is designed for applications with a need for improved area efficiency but without the requirement for PDF417's maximum data capacity. It may only be printed in specific combinations of rows and columns up to a maximum of four data columns by 44 rows.

Field data (^FD) and field hexadecimal (^FH) are limited to:

- 250 7-bit characters
- 150 8-bit characters
- 366 4-bit numeric characters

Format: ^BFo,h,m

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Current ^FW value

h = bar code height (in dots)
Accepted Values: 1 to 9999
Default Value: Value set by ^BY or 10 (if no ^BY value exists)

m = mode
Accepted Values: 0 to 33 (refer to the Micro-PDF Mode table on page 52)
Default Value: 0 (refer to the Micro-PDF Mode Table on page 52)

Example: The following ZPL II code will generate the bar code printed at left:

```
^XA^BY6^BFN,8,3
^FDABCDEFGHIJKLMNOPQRSTUV^FS
^XZ
```

To encode data into the Micro-PDF417 bar code, follow the procedure below.

Encoding Data into a Micro-PDF417 Bar Code

1. Determine the type of data that will be encoded (e.g., ASCII characters, numbers, 8-bit data, or a combination).
2. Determine the maximum amount of data that will be encoded within the bar code (e.g., number of ASCII characters, quantity of numbers, or quantity of 8-bit data characters).
3. Determine the percentage of check digits that will be used within the bar code. The higher percentage of check digits that are used, the more resistant the bar code will be to damage – however, the size of the bar code will increase.
4. Use the Micro-PDF417 Mode Table on the next page with the information gathered from the questions above to select the mode of the bar code.

Micro-PDF417 Mode Table

Mode (M)	Number of Data Columns	Number of Data Rows	% of Cws for EC	Max Alpha Characters	Max Digits
0	1	11	64	6	8
1	1	14	50	12	17
2	1	17	41	18	26
3	1	20	40	22	32
4	1	24	33	30	44
5	1	28	29	38	55
6	2	8	50	14	20
7	2	11	41	24	35
8	2	14	32	36	52
9	2	17	29	46	67
10	2	20	28	56	82
11	2	23	28	64	93
12	2	26	29	72	105
13	3	6	67	10	14
14	3	8	58	18	26
15	3	10	53	26	38
16	3	12	50	34	49
17	3	15	47	46	67
18	3	20	43	66	96
19	3	26	41	90	132
20	3	32	40	114	167
21	3	38	39	138	202
22	3	44	38	162	237
23	4	6	50	22	32
24	4	8	44	34	49
25	4	10	40	46	67
26	4	12	38	58	85
27	4	15	35	76	111
28	4	20	33	106	155
29	4	26	31	142	208
30	4	32	30	178	261
31	4	38	29	214	313
32	4	44	28	250	366
33	4	4	50	14	20

^BI

Industrial 2 of 5 Bar Code

Description: The ^BI command is a discrete, self-checking, continuous numeric symbology. Industrial 2 of 5 bar code has been in use the longest of the 2 of 5 family of bar codes. Of that family, the Standard 2 of 5 and Interleaved 2 of 5 bar codes are also available in ZPL II.

With Industrial 2 of 5, all of the information is contained in the bars. Two bar widths are employed in this code, the wide bar measuring three times the width of the narrow bar.

- ^BI supports a print ratio of 2.0:1 to 3.0:1.
- Field data (^FD) is limited to the width (or length, if rotated) of the label.

Format: ^BIo,h,f,g

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Current ^FW value

h = bar code height (in dots)
Accepted Values: 1 to 32000
Default Value: Value set by ^BY

f = print interpretation line
Accepted Values: Y (yes) or N (no)
Default Value: Y

g = print interpretation line above code
Accepted Values: Y (yes) or N (no)
Default Value: N

Example:

Industrial 2 of 5 Bar Code Characters

0	1
2	3
4	5
6	7
8	9

Start (internal)
Stop (internal)

Comments: If additional information about the Industrial 2 of 5 bar code is required, refer to Appendix H in *Volume Two* for AIM, Inc. contact information.

^BJ

Standard 2 of 5 Bar Code

Description: The ^BJ command is a discrete, self-checking continuous numeric symbology.

With Standard 2 of 5, all of the information is contained in the bars. Two bar widths are employed in this code, the wide bar measuring three times the width of the narrow bar.

- ^BI supports a print ratio of 2.0:1 to 3.0:1.
- Field data (^FD) is limited to the width (or length, if rotated) of the label.

Format: ^BJo,h,f,g

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Current ^FW value

h = bar code height (in dots)
Accepted Values: 1 to 32000
Default Value: Value set by ^BY

f = print interpretation line
Accepted Values: Y (yes) or N (no)
Default Value: Y

g = print interpretation line above code
Accepted Values: Y (yes) or N (no)
Default Value: N

Example:

Standard 2 of 5 Bar Code Characters

0	1
2	3
4	5
6	7
8	9

Start (automatic)
Stop (automatic)

Comments: If additional information about the Standard 2 of 5 bar code is required, refer to Appendix H in *Volume Two* for AIM, Inc. contact information.

^BK

ANSI Codabar

Description: The ^BK command is currently used in a variety of information processing applications such as libraries, the medical industry, and overnight package delivery companies. This bar code is also known as USD-4 code, NW-7 and 2 of 7 code. It was originally developed for retail price-labeling use.

Each character in this code is composed of seven elements: four bars and three spaces. Codabar bar codes use two character sets, numeric and control (start/stop) characters.

- ^BI supports a print ratio of 2.0:1 to 3.0:1.
- Field data (^FD) is limited to the width (or length, if rotated) of the label.

Format: ^BKo,e,h,f,g,k,l

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Current ^FW value

e = check digit (not implemented)
Accepted Values: Y (yes) and N (no)
Default Value: N

h = bar code height (in dots)
Accepted Values: 1 to 32000
Default Value: Value set by ^BY

f = print interpretation line
Accepted Values: Y (yes) or N (no)
Default Value: Y

g = print interpretation line above code
Accepted Values: Y (yes) or N (no)
Default Value: N

k = designates start character
Accepted Values: B, C, D, E, N, T, or *
Default Value: A

l = designates stop character
Accepted Values: B, C, D, E, N, T, or *
Default Value: A

Example:

ANSI Codabar Characters

0	1
2	3
4	5
6	7
8	9

Control Characters

-	**$**
:	/
.	+

Start/Stop Characters

A	T
B	N
C	*
D	E

Comments: If additional information about the ANSI Codabar bar code is required, refer to Appendix H in *Volume Two* for AIM, Inc. contact information.

^BL

LOGMARS Bar Code

Description: The ^BL command is a special application of Code 39 used by the Department of Defense (DOD). LOGMARS is an acronym for Logistics Applications of Automated Marking and Reading Symbols.

- ^BI supports a print ratio of 2.0:1 to 3.0:1.
- Field data (^FD) is limited to the width (or length, if rotated) of the label.

Format: ^BLo,h,g

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Current ^FW value

h = bar code height (in dots)
Accepted Values: 1 to 32000
Default Value: Value set by ^BY

g = print interpretation line above code
Accepted Values: Y (yes) or N (no)
Default Value: N

Example:

```
^XA^FD100,75^BY3
^BLN,100,N
^FD12AB^XZ
```

LOGMARS Characters

1 2 3 4 5 6 7 8 9 0

A B C D E F G H I

J K L M N O P Q R

S T U V W X Y Z

- . * $ / + %

SPACE

Comments: The LOGMARS bar code produces a “mandatory” check digit using MOD 43 calculations. For further information, refer to Appendix D in *Volume Two.*

If additional information about the ANSI Codabar bar code is required, refer to Appendix H in *Volume Two* for AIM, Inc. contact information.

^BM

MSI Bar Code

Description: The ^BM command is a pulse-width modulated, continuous, non-self checking symbology. It is a variant of the Plessey bar code.

Each character in the MSI bar code is composed of eight elements: four bars and four adjacent spaces.

- ^BI supports a print ratio of 2.0:1 to 3.0:1.
- Field data (^FD) is limited to 1 to 14 digits when parameter *e* is B, C, or D. ^FD is limited to 1 to 13 digits when parameter *e* is A, plus a quiet zone.

Format: ^BMo,e,h,f,g,e2

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Current ^FW value

e = check digit selection
Accepted Values:
A = no check digits
B = 1 Mod 10
C = 2 Mod 10
D = 1 Mod 10 and 1 Mod 11
Default Value: B

h = bar code height (in dots)
Accepted Values: 1 to 32000
Default Value: Value set by ^BY

f = print interpretation line
Accepted Values: Y (yes) or N (no)
Default Value: Y

g = print interpretation line above code
Accepted Values: Y (yes) or N (no)
Default Value: N

e2 = designates start character
Accepted Values: Y (yes) or N (no)
Default Value: N

Example:

MSI Characters

1 2
3 4
5 6
7 8
9

Comments: If additional information about the MSI bar code is required, refer to Appendix H in *Volume Two* for AIM, Inc. contact information.

^BP

Plessey Bar Code

Description: The ^BP command is a pulse-width modulated, continuous, non-self-checking symbology.

Each character in the Plessey bar code is composed of eight elements: four bars and four adjacent spaces.

- ^BI supports a print ratio of 2.0:1 to 3.0:1.
- Field data (^FD) is limited to the width (or length, if rotated) of the label.

Format: ^BPo,e,h,f,g

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Current ^FW value

e = print check digit
Accepted Values: Y (yes) and N (no)
Default Value: N

h = bar code height (in dots)
Accepted Values: 1 to 32000
Default Value: Value set by ^BY

f = print interpretation line
Accepted Values: Y (yes) or N (no)
Default Value: Y

g = print interpretation line above code
Accepted Values: Y (yes) or N (no)
Default Value: N

Example:

Plessy Characters	
0	8
1	9
2	A
3	B
4	C
5	D
6	E
7	F

Comments: If additional information about the Plessy bar code is required, refer to Appendix H in *Volume Two* for AIM, Inc. contact information.

^BQ

QR Code Bar Code

Description: The ^BQ command produces a matrix symbology consisting of an array of nominally square modules arranged in an overall square pattern. A unique pattern at three of the symbol's four corners assists in determining bar code size, position, and inclination.

A wide range of symbol sizes is possible along with four levels of error correction. User-specified module dimensions provide a wide variety of symbol production techniques.

QR Code Model 1 is the original specification, while QR Code Model 2 is an enhanced form of the symbology. Model 2 provides additional features and can be automatically differentiated from Model 1.

Model 2 is the *recommended model* and should normally be used.

This bar code is printed using field data specified in a subsequent ^FD stream.

Encodable character sets include numeric data, alphanumeric data, 8-bit byte data, and Kanji characters.

Format: ^BQa,b,c

Parameters:

a = field position
Accepted Values: Rotation is not supported. ^FW has no effect on rotation.
Fixed Value: Normal

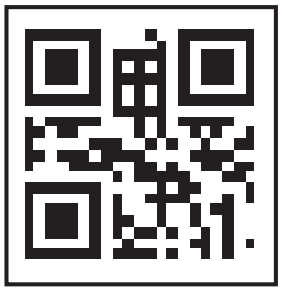
b = model
Accepted Values: 1 (original) and 2 (enhanced – *recommended*)
Default Value: 2

c = magnification factor
Accepted Values: 1 through 10
Default Value:
1 on 150 dpi printers
2 on 200 dpi printers
3 on 300 dpi printers
6 on 600 dpi printers

Example:

The following ZPL II code will generate the label printed below.

```
^XA
^FO20,20^BQN,2,10^FDMM,AAC-42^FS
^XZ
```



Comments: If additional information about the QR Code bar code is required, refer to Appendix H in *Volume Two* for AIM, Inc. contact information.

On the following pages are specific commands for formatting the ^BQ command with the ^FD statements that contain the information to be coded.

Considerations for ^FD When Using the QR Code:

QR Switches (formatted into the ^FD field data)

Mixed mode <D>
D = allows mixing of different types of character modes in one code.

Code No. <01 16>
Value = subtracted from the Nth number of the divided code (must be 2 digits).

No. of divisions <02 16>
No. of divisions (must be 2 digits).

Parity data <1 byte>
Value obtained by calculating at the input data (the original input data before divided byte-by-byte through the EX-OR operation).

Error correction level <H, Q, M, L>
H = Ultra High Reliability Level
Q = High Reliability Level
M = Standard Level (Default)
L = High Density Level

Character Mode <N, A, B, K>
N = Numeric
A = Alphanumeric
B*xxxx* = 8-bit Byte mode. Handles the 8-bit Latin/Kana character set in accordance with JIS X 0201 (character values 0x00 to 0xFF).
xxxx = No. of data characters is represented by 2 bytes of BCD code
K = Kanji. Only handles Kanji characters in accordance with the Shift JIS system based on JIS X 0208. This means that all parameters after the character mode "K" should be 16-bit characters. If there are any 8-bit characters (such as ASCII code), an error will occur.

Data character string <Data>
Follows character mode or it will be the last switch in the ^FD statement.

Data input <A, M>

A = Automatic input (default). Data character string JIS8 unit, Shift JIS. When the input mode is automatic input, the binary codes of 0x80 to 0x9F and 0xE0 to 0xFF cannot be set.

M = Manual input

Two types of *data input mode* exist: Automatic (A) and Manual (M). If A is specified, the character mode does not need to be specified. If M is specified, the character mode must be specified.

^FD Field Data (Normal Mode)

Automatic Data Input (A) with Switches

```
^FD
<Error correction level>A,
<Data character string>
^FS
```

Example: QR code, normal mode with automatic data input

```
^XA
^FO20,20^BQ,2,10^FDQA,0123456789ABCD 2D code^FS
^XZ
```

<Error Correction level>	Q	(high)
<Input Mode>	A	(automatic setting)
<Data character string>		0123456789ABCD 2D code

Manual Data Input (M) with Switches

```
^FD
<Error correction level>M,
<character mode><data character string>
^FS
```

Example: QR code, normal mode with manual data input

```
^XA
^FO20,20^BQ,2,10^FDHM,N123456789012345^FS
^XZ
```

<Error Correction level>	H	(ultra-high reliability level)
<input mode>	M	(manual input)
<character mode>	N	(numeric data)
<data character string>		123456789012345

Example: QR code, normal mode with standard reliability and manual data input.

```
^XA
^FO20,20^BQ,2,10^FDMM,AAC-42^FS
^XZ
```

<Error Correction level>	M	(standard reliability level)
<input mode>	M	(manual input)
<character mode>	A	(alphanumeric data)
<data character string>		AC-42

^FD Field Data (Mixed Mode – requires more switches)

Automatic Data Input (A) with Switches

^FD
<Code No.> <No. of divisions> <Parity data>,
<Error correction level> A,
<Data character string>,
<Data character string>,
< : >,
<Data character string n**>
^FS

Manual Data Input (M) with Switches

^FD
<Code No.> <No. of divisions> <Parity data>,
<Error correction level> M,
<Character mode 1> <Data character string 1>,
<Character mode 2> <Data character string 2>,
< : >< : >,
<Character mode n> <Data character string n**>
^FS

n** up to 200 in mixed mode

Example: QR code, mixed mode with manual data input

```
^XA
^FO,20,20^BQ,2,10^FDD03048F,LM,N0123456789,A12AABB,B0
006qrcode^FS
^XZ
```

<Mixed mode identifier>	D	(mixed)
<Code No.>	M	(code number)
<No. of divisions>	D	(divisions)
<Parity data>	M	(0x8F)
	,	
<Error correction level>	L	(high-density level)
<Input mode>	M	(manual input)
	,	
Character mode>	N	(numeric data)
<Data character string>		0123456789
	,	
<Character mode>	A	(alphanumeric data)
<Data character string>		12AABB
	,	
<Character mode>	B	(8-bit byte data)
	0006	Number of bytes
<Data character string>		qrcode

Example: QR Code, Mixed Mode with automatic data Input

```
^XA
^FO20,20^BQ,2,10^FDD03048F,LA,012345678912AABBqrcode
^FS
^XZ
```

<Mixed mode identifier>	D	(mixed)
<Code No.>	M	(code number)
<No. of divisions>	D	(divisions)
<Parity data>	M	(0x8F)
<Error correction level>	L	(high-density level)
<Input mode>	A	(automatic input)
<Data character string>		012345678912AABBqrcode

^BS

UPC/EAN Extensions

Description: The ^BS (UPC/EAN extensions) command is the 2- and 5-digit add-on used primarily by publishers to create bar codes for ISBN's (International Standard Book Numbers). These extensions are handled as separate bar codes.

The ^BS command is designed to be used with ^BU (UPC-A Bar Code) and ^B9 (UPC-E Bar Code).

- ^BI supports a fixed print ratio.
- Field data (^FD) is limited to exactly 2 or 5 characters. ZPL II automatically truncates or pads on the left with zeros to achieve required number of characters.

Format: ^BSo,h,f,g

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Current ^FW value

h = bar code height (in dots)
Accepted Values: 1 to 32000
Default Value: Value set by ^BY

f = print interpretation line
Accepted Values: Y (yes) or N (no)
Default Value: Y

g = print interpretation line above code
Accepted Values: Y (yes) or N (no)
Default Value: Y

UPC/EAN Two-Digit Example:

```
^XA^FO150,100^BY3
^BSN,100,Y,N
^FD12^XZ
```

UPC/EAN Two-digit Characters	
0	1
2	3
4	5
6	7
8	9

UPC/EAN Five-Digit Example:

```
^XA^FO150,100^BY3
^BSN,100,Y,N
^FD12345^XZ
```

UPC/EAN Five-digit Characters	
0	1
2	3
4	5
6	7
8	9

Care should be taken in positioning the UPC/EAN extension with respect to the UPC-A or UPC-E code to insure the resultant composite code is within the UPC specification.

For UPC codes, with a module width of 2 (default), the Field Origin offsets for the extension are as follows:

UPC-A

	Supplement Origin X - Offset	Adjustment Y - Offset
Normal	209 Dots	21 Dots
Rotated	0	209 Dots

UPC-E

	Supplement Origin X - Offset	Adjustment Y - Offset
Normal	122 Dots	21 Dots
Rotated	0	122 Dots

Additionally, the bar code height for the extension should be 27 dots (0.135 inches) shorter than that of the Primary code. A Primary UPC code height of 183 dots (0.900 inches) would require a extension height of 155 dots (0.765).

The figure below shows an example of how to create a normal UPC-A code for the value 7000002198 with an extension equal to 04414.

```
^XA^FO100,100^BY3
^BUN,137
^FD07000002198^FS
^FO400,121
^BSN,117
^FD04414^XZ
```

Comments: If additional information about the UPC/EAN bar code is required, refer to Appendix H in *Volume Two* for AIM, Inc. contact information.

^BU

UPC-A Bar Code

Description: The ^BU command is a fixed length, numeric symbology. It is primarily used in the retail industry for labeling packages. The UPC-A bar code has 11 data characters. The 6 dot/mm, 12 dot/mm, and 24 dot/mm printheads produce the UPC-A bar code (UPC/EAN symbologies) at 100 percent size. However, an 8 dot/mm printhead will produce the UPC/EAN symbologies at a magnification factor of 77 percent.

- ^BI supports a fixed print ratio.
- Field data (^FD) is limited to exactly 11 characters. ZPL II automatically truncates or pads on the left with zeros to achieve required number of characters.

Format: ^BUo,h,f,g,e

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Current ^FW value

h = bar code height (in dots)
Accepted Values: 1 to 9999
Default Value: Value set by ^BY

f = print interpretation line
Accepted Values: Y (yes) or N (no)
Default Value: Y

g = print interpretation line above code
Accepted Values: Y (yes) or N (no)
Default Value: N

e = print check digit
Accepted Values: Y (yes) and N (no)
Default Value: Y

The font style of the interpretation line depends on the modulus (width of narrow bar) selected in ^BY:

6 dot/mm printer: A modulus of 2 dots and greater will print with an OCR-B interpretation line; a modulus of 1 dot will print font A.

8 dot/mm printer: A modulus of 3 dots and greater will print with an OCR-B interpretation line; a modulus of 1 or 2 dots will print font A.

12 dot/mm printer: A modulus of 5 dots and greater will print with an OCR-B interpretation line; a modulus of 1, 2 or 3 dots will print font A**.**

24 dot/mm printer: A modulus of 9 dots and greater will print with an OCR-B interpretation line; a modulus of 1 to 8 dots will print font A.

Example:

UPC-A Characters

0 1

2 3

4 5

6 7

8 9

Comments: The UPC-A bar code uses the Mod 10 check digit scheme for error checking. For further information on Mod 10, refer to Appendix C in *Volume Two.*

If additional information about the UPC-A bar code is required, refer to Appendix H in *Volume Two* for AIM, Inc. contact information.

^BX

Data Matrix Bar Code

Description: The ^BX command is a two-dimensional matrix symbology which is made up of square modules arranged within a perimeter finder pattern.

Format: ^BXo,h,s,c,r,f,g

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Current ^FW value

h = dimensional height of individual symbol elements (one to width of label)
The individual elements are square – this parameter specifies both module and row height. If this parameter is zero (or not given), the *h* parameter (bar height) in ^BY will be used as the approximate symbol height.

s = quality level
Accepted Values: 0, 50, 80, 100, 140, 200
Default Value: 0
"Quality" refers to the amount of data that is added to the symbol for error correction. The AIM specification refers to it as the ECC value. ECC 50, ECC 80, ECC 100, and ECC 140 use convolution encoding; ECC 200 uses Reed-Solomon encoding. For new applications, ECC 200 is recommended. ECC 000-140 should only be used in closed applications where a single party controls both the production and reading of the symbols and is responsible for overall system performance.

c = columns to encode (9 to 49)
Odd values only for quality 0 to 140 (10 to 144); even values only for quality 200.

r = rows to encode (9 to 49)

Odd values only for quality 0 to 140 (10 to 144); even values only for quality 200.

The number of rows and columns in the symbol will be automatically determined. The user may wish to force the number of rows and columns to a larger value to achieve uniform symbol size. In the current implementation, quality 0 to 140 symbols will always be square, so the larger of the rows or columns supplied will be used to force a symbol to that size. If the user attempts to force the data into too small of a symbol, no symbol will be printed. If a value greater than 49 is entered, the rows or columns value will be set to zero and the size will be determined normally. If an even value is entered, it will generate INVALID-P (invalid parameter). If a value less than 9 but not 0, or if the data is too large for the forced size, no symbol will print; if ^CVY is on, INVALID-L will print.

f = format ID (0 to 6) – not used with quality set at 200

Accepted Values:

1 = Field data is numeric + space (0..9,") – No \&''

2 = Field data is upper-case alphanumeric + space (A..Z,'') – No \&''

3 = Field data is uppercase alphanumeric + space, period, comma, dash, and slash (0..9,A..Z,".-/")

4 = Field data is upper-case alphanumeric + space (0..9,A..Z,'') – No \&''

5 = Field data is full 128 ASCII 7-bit set

6 = Field data is full 256 ISO 8-bit set

Default Value: 6

g = escape sequence control character

Accepted Values: Any character

Default Value: _ (underscore)

This parameter is only used if quality "200" is specified. It is the escape character for embedding special control sequences within the field data. Refer to Field Data (^FD) for Data Matrix for usage.

ECC LEVEL	ID = 1	ID = 2	ID = 3	ID = 4	ID = 5	ID = 6
0	596	452	394	413	310	271
50	457	333	291	305	228	200
80	402	293	256	268	201	176
100	300	218	190	200	150	131
140	144	105	91	96	72	63

Maximum Field Sizes

Example:

```
^XA
^LL500^LH0,0
^FO100,100^BXN,10,200,,,,
^FDZEBRA TECHNOLOGIES CORP,
333 CORPORATE WOODS PKWY
VERNON HILLS, ILLINOIS
60061-3109^FS
^XZ
```

Effects of ^BY on ^BX

w = **module** (no effect – see dimensions of individual symbol elements)
r = **ratio** (no effect)
h = **height of symbol**
If the dimensions of individual symbol elements are not specified in the ^BD command, the height of symbol value will be divided by the required rows/columns, rounded, limited to a minimum value of one, and used as the dimensions of individual symbol elements.

Field Data (^FD) for ^BX

Quality 000 to 140

- The "\&" and "|" can be used to insert carriage return/line feed and back slash as with PDF417. Other characters in the control character range can only be inserted by using ^FH. Field data is limited to 596 characters for quality "0" to "140." Excess field data will cause no symbol to be printed; if ^CVY is on, INVALID-L will be printed. The field data must correspond to a user-specified format ID or no symbol will be printed; if ^CVY is on, INVALID-C will be printed.
- The maximum field sizes for quality "0" to "140" symbols are shown in the following table:

Quality 200

- If more than 3072 characters are supplied as field data, it is truncated to 3072 characters. This limits the maximum size of a numeric Data Matrix symbol to less than the 3116 numeric characters that the specification would allow. The maximum alphanumeric capacity is 2335 and the maximum 8-bit byte capacity is 1556.
- If ^FH is used, field hex processing takes place before the escape sequence processing described below.
- The underscore is the default escape sequence control character for quality "200" field data. A different escape sequence control character may be selected by using parameter *g* in the ^BX command.

The input string escape sequences may be embedded in Quality 200 field data using the _ character (ASCII 45, underscore) or the character entered in parameter *g*:

- _X is the shift character for control characters (e.g., _@=NUL,_G=BEL,_0 is PAD)
- _1 to _3 for FNC characters 1 to 3 (explicit FNC4, upper shift, is not allowed)
- FNC2 (Structured Append) must be followed by 9 digits, composed of three 3-digit numbers with values between 1 and 254, that represent the symbol sequence and file identifier (for example, symbol 3 of 7 with file ID 1001 is represented by 2214001001)
- 5NNN is Code Page NNN where NNN is a 3-digit Code Page value (e.g., Code Page 9 is represented by _5009)
- _dNNN creates ASCII decimal value NNN for a code word (must be 3 digits)
- _ in data is encoded by __ (two underscores)

^BY

Bar Code Field Default

Description: The ^BY command is used to change the default values for the Narrow Element Module (Narrow Bar or Space) Width, the Wide Bar to Narrow Bar Width Ratio and the Bar Height. It can be used as often as necessary within a label format.

Format: ^BYw,r,h

Parameters:

w = module (narrow bar) width (in dots)
Accepted Values: 1 to 10
Initial Value at Power-up: 2

r = wide bar to narrow bar width ratio
Accepted Values: 2.0 to 3.0, in .1 increments
(no effect on fixed ratio bar codes)

h = height of bars (in dots)
Accepted Values: 1 to 32000
Initial Value at Power-up: 10

For parameter *r*, the actual ratio generated is a function of the number of dots in parameter *w*, narrow bar (module). Refer to the table "Bar Code Print Ratios" on the following page.

For example, set module width (*w*) to 9 and the ratio (*r*) to 2.4. The width of the narrow bar is 9 dots wide and the wide bar is 9 x 2.4 or 21.6 dots. However, since the printer rounds out to the nearest dot, the wide bar is actually printed at 22 dots.

This produces a bar code with a ratio of 2.44 (22 divided by 9). This ratio is as close to 2.4 as possible, since only full dots are printed.

Module width and height (*w* and *h*) may be changed at anytime with the ^BY command regardless of the symbology selected.

Ratio Selected (r)	Module Width in Dots (w)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
2.0	2:1	2:1	2:1	2:1	2:1	2:1	2:1	2:1	2:1	2:1
2.1	2:1	2:1	2:1	2:1	2:1	2:1	2:1	2:1	2:1	2.1:1
2.2	2:1	2:1	2:1	2:1	2.2:1	2.16:1	2.1:1	2.12:1	2.1:1	2.2:1
2.3	2:1	2:1	2.3:1	2.25:1	2.2:1	2.16:1	2.28:1	2.25:1	2.2:1	2.3:1
2.4	2:1	2:1	2.3:1	2.25:1	2.4:1	2.3:1	2.28:1	2.37:1	2.3:1	2.4:1
2.5	2:1	2.5:1	2.3:1	2.5:1	2.4:1	2.5:1	2.4:1	2.5:1	2.4:1	2.5:1
2.6	2:1	2.5:1	2.3:1	2.5:1	2.6:1	2.5:1	2.57:1	2.5:1	2.5:1	2.6:1
2.7	2:1	2.5:1	2.6:1	2.5:1	2.6:1	2.6:1	2.57:1	2.65:1	2.6:1	2.7:1
2.8	2:1	2.5:1	2.6:1	2.75:1	2.8:1	2.6:1	2.7:1	2.75:1	2.7:1	2.8:1
2.9	2:1	2.5:1	2.6:1	2.75:1	2.8:1	2.8:1	2.85:1	2.87:1	2.8:1	2.9:1
3.0	3:1	3:1	3:1	3:1	3:1	3:1	3:1	3:1	3:1	3:1

Comments: Once a ^BY command is entered into a label format, it stays in effect until another ^BY command is encountered.

^BZ

POSTNET Bar Code

Description: The POSTNET bar code is used to automate the handling of mail. POSTNET uses a series of five bars, two tall and three short, to represent the digits 0 to 9.

- ^BI supports a print ratio of 2.0:1 to 3.0:1.
- Field data (^FD) is limited to the width (or length, if rotated) of the label.

Format: ^BZo,h,f,g

Parameters:

o = orientation
Accepted Values:
N = normal
R = rotated 90 degrees (clockwise)
I = inverted 180 degrees
B = read from bottom up, 270 degrees
Default Value: Current ^FW value

h = bar code height (in dots)
Accepted Values: 1 to 32000
Default Value: Value set by ^BY

f = print interpretation line
Accepted Values: Y (yes) or N (no)
Default Value: N

g = print interpretation line above code
Accepted Values: Y (yes) or N (no)
Default Value: N

Example:

POSTNET Characters

0 1

2 3

4 5

6 7

8 9

Comments: If additional information about the POSTNET Bar Code is required, refer to Appendix H in *Volume Two* for AIM, Inc. contact information, or contact the United States Postal Service and ask for *Publication 25 – Designing Letter Mail*, which includes a full specification for POSTNET. You can also download *Publication 25* from the URL below:

http://pe.usps.gov/cpim/ftp/pubs/pub25/pub25.pdf

^CC ~CC

Change Caret

Description: The ^CC and ~CC commands are used to change the format command prefix. The default prefix is the caret (^).

Format: ^CCx *or* ~CCx

Parameters:

x = caret character change
Accepted Values: any ASCII character
Default Value: a parameter is required. If no parameter is entered, the next character received will be the new prefix character.

Example:

```
^XA
^CC/
/XZ
```

Comments: In the above example, the forward slash (/) is set at the new prefix. Note the /XZ ending tag uses the new designated prefix character (/).

^CD ~CD

Change Delimiter

Description: The ^CD and ~CD commands are used to change the ZPL II delimiter character. This character is used to separate parameter values associated with several ZPL II commands. The default delimiter is a comma (,).

Format: ^CDa *or* ~CDa

Parameters:

a = delimiter character change
Accepted Values: any ASCII character
Default Value: a parameter is required. If no parameter is entered, the next character received will be the new prefix character.

Example:

```
^XA
^CD.
^XZ
```

Comments: In the above example, the delimiter character is changed to a period (.).

^CF

Change Alphanumeric Default Font

Description: You can use the ^CF command to keep your programs simple. The ^CF command sets the default font used in your printer.

Format: ^CFf,h,w

Parameters:

f = specified default font
Accepted Values: A through H, and numerals 0 to 9.
Initial Value at Power-up: A

h = individual character height (in dots)
Accepted Values: 0 to 32000
Initial Value at Power-up: 9

w = individual character width (in dots)
Accepted Values: 0 to 32000
Initial Value at Power-up: 5 or last permanent saved value.

Parameter *f* specifies the default font for every alphanumeric field. Parameter *h* is default height for every alpha field, parameter *w* is default width value for every alpha field.

The default alphanumeric font is A. If you do not change the alphanumeric default font (^CF command) and do not use any alphanumeric field command (^Af) or enter an invalid font value, any data you specify will print in font A.

Defining only the height or width forces the magnification to be proportional to the parameter defined. If neither value is defined, the last ^CF values given or the default ^CF values for height and width are used.

Example:

This example specifies the desired font information once using the ^CF command.

```
^XA
^CF0,89
^FO120,50^FDA Guide to^FS
^FO120,150^FDthe ZPL II^FS
^FO120,250^FDProgramming^FS
^FO120,350^FDLanguage
^XZ
```

Comments: Any font in the printer, including downloaded fonts, EPROM stored fonts, and fonts A through Z and 1 to 9 can also be selected with ^CW.

^CI

Change International Font

Description: Zebra printers can print all fonts using various international character sets: USA1, USA2, UK, Holland, Denmark/Norway, Sweden/Finland, Germany, France 1, France 2, Italy, Spain, and miscellaneous.

ZPL II follows the ISO standards for international characters.

The ^CI command enables you to call up the international character set you want to use for printing. You can mix character sets on a label. The following page shows the international character sets available.

This command allows character remapping. Any character within a font can be remapped to a different numerical position.

Format: ^CIa,s1,d1,s2,d2,...

Parameters:

a = desired character set
Accepted Values:
0 = U.S.A. 1
1 = U.S.A. 2
2 = UK
3 = Holland
4 = Denmark/Norway
5 = Sweden/Finland
6 = Germany
7 = France 1
8 = France 2
9 = Italy
10 = Spain
11 = miscellaneous
12 = Japan (ASCII with Yen symbol)
13 = IBM Code Page 850
14 = 16 bit (Unicode) encoded scalable fonts*
15 = Shift-JIS for scalable Japanese fonts**
16 = EUC-Kanji for scalable fonts
17 = Unicode (for Unicode encoded fonts)
18 to 23 = Reserved
24 = 8-bit access to Unicode encoded fonts
Initial Value at Power-up: last permanent value saved.

s1 = source 1 (character position to be remapped)
Accepted Values: decimals 0 to 255

d1 = destination 1 (new position for the character referred to in s1)
Accepted Values: decimals 0 to 255

s2 = source 2 (character position to be remapped)
Accepted Values: decimals 0 to 255

d2 = destination 2 (new position for the character referred to in s2)
Accepted Values: decimals 0 to 255

… = continuation of pattern
Up to 256 source and destination pairs can be entered in this command.

The encoding is controlled by the conversion table (.DAT). The table generated by ZTools™ is the TrueType font's internal encoding (Unicode).

** Shift-JIS encoding converts Shift-JIS to JIS and then looks up the JIS conversion in JIS.DAT. This table must be present for Shift-JIS to function

Example:

This example re-maps the Euro symbol (21) to the Dollar sign value (36). In this way, when the dollar sign character is sent to the printer, the Euro symbol will print. The Euro symbol value, 15 Hex, equals 21 decimal, and the Dollar sign value, 24 Hex, equals 36 decimal.

```
^CI0,21,36
```

International Character Sets

Hex	23	30	40	5B	5C	5D	5E	60	7B	7C	7D	7E
CI0	#	0	@	[	¢	]	^	`	{	¦	}	~
CI1	#	0	@	⅓	¢	⅔	^	`	¼	½	¾	~
CI2	£	0	@	[	¢	]	^	`	{	¦	}	~
CI3	ƒ	0	§	[	IJ	]	^	`	{	ij	}	~
CI4	#	0	@	Æ	Ø	Å	^	`	æ	ø	å	~
CI5	Ü	0	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
CI6	#	0	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
CI7	£	0	à	[	ç	]	^	`	é	¦	ù	è
CI8	#	0	à	â	ç	ê	î	ô	é	ù	è	û
CI9	£	0	§	[	ç	é	^	ù	à	ò	è	ì
CI10	#	0	§	¡	Ñ	¿	^	`	{	ñ	ç	~
CI11	£	0	É	Ä	Ö	Ü	^	ä	ë	ï	ö	ü
CI12	#	0	@	[	¥	]	^	`	{	¦	}	~
CI13	#	0	@	[	\	]	^	`	{	¦	}	~

Comments: The "space" character cannot be remapped for any font.

^CM

Change Memory Letter Designation

Description: The ^CM command allows the user to reassign a letter designation to the printer's memory devices. If a format already exists, you can reassign the memory device to the corresponding letter without being forced to alter or recreate the format itself.

Using this command will impact every subsequent command that refers to specific memory locations.

Format: ^CMa,b,c

Parameters:

a = memory alias letter designation
Accepted Values: B:, E:, R:, none
Default Value: B:

b = memory alias letter designation
Accepted Values: B:, E:, R:, none
Default Value: E:

c = memory alias letter designation
Accepted Values: B:, E:, R:, none
Default Value: R:

Comments: If two or more parameters specify the same letter designator, all letter designators will be set to their default values.

If any of the parameters are out of specification, the command will be ignored.

Example:

This example designates letter E: to point to the B: memory device, and the letter B: to point to the E: memory device.

```
^XA^CME,B,R^JUS^XA
```

This example resets all letter designations to point to themselves.

```
^XA^CME,B,B^JUS^XA
```

This example sets all letter designation to point to themselves.

```
^XA^CM,,R^JUS^XZ
```

Comments: It is recommended that after entering the ^CM command, ^JUS is entered to save changes to EEPROM. Any duplicate parameters entered will reset the letter designations back to the default.

^CO

Cache On

Description: The ^CO command is used to change the size of the character cache. By definition, a "character cache" (from here on referred to as cache) is a portion of the DRAM reserved for storing scalable characters. All printers have a default 22K cache that is always turned on. The maximum single character size that can be stored, without changing the size of the cache, is 450 dots by 450 dots.

There are two types of fonts used in Zebra printers: bitmapped and scalable. Letters, numbers, and symbols in a bitmapped font have a fixed size. For example: 10 points, 12 points, 14 points, etc. On the other hand, scalable fonts are not fixed in size. Their sizes are user-selectable.

Because their size is fixed, bitmapped fonts can be moved quickly to the label. By contrast, scalable fonts are much slower because each character is built on an as-needed basis before it is moved to the label. By storing scaled characters in a "cache" they can be recalled at a much faster speed.

The number of characters that can be stored in the cache depends on two factors: the size of the cache (memory) and the size of the character (in points) being saved. The larger the point size, the more space in the cache it uses. The default cache stores every scalable character that is requested for use on a label(s). If the same character, with the same rotation and size is used again, it is quickly retrieved from the cache.

It is quite possible that after a while the print cache could become full. Once the cache is full, space for new characters is obtained by eliminating an existing character from the print cache. Existing characters are eliminated by determining how often they have been used. This is done automatically. For example, a 28 point "Q" that was used only once would be a good candidate for elimination from the cache.

Maximum size of a single print cache character is 1500 dots by 1500 dots. It would require a cache of 300K for this.

When the cache is too small for the desired style, smaller characters may appear but larger characters will not. If possible, increase the size of the cache.

Format: ^COa,b,c

Parameters:

a = cache on
Accepted Values: Y (yes) or N (no)
Default Value: Y

b = amount of additional memory to be added to cache (in K)
Accepted Values: any size up to total memory available
Default Value: 40K

c = cache type
Accepted Values:
0 = cache buffer (normal fonts)
1 = internal buffer (recommended for Asian fonts
Default Value: 0

Example:

To resize the print cache to 62K, assuming a 22K existing cache:

```
^COY,40
```

To resize the print cache to 100K, assuming a 22K existing cache:

```
^COY,78
```

Print Cache Performance:

For printing large characters, memory added to the cache by the ^CO command is not physically added to the 22K cache already in the printer. In the second example above, the resultant 100K cache is actually two separate blocks of memory, 22K and 78K.

Since large characters need contiguous blocks of memory, a character requiring a cache of 90K would not be completely stored because neither portion of the 100K cache is big enough. Therefore, if large characters are needed, the ^CO command should reflect the actual size of the cache you need.

Increasing the size of the cache will improve the performance in printing scalable fonts. However, the performance will start to go down if the size of the cache becomes large and contains too many characters. The performance gained will be lost because of the time involved in searching through the cache for all of the characters.

Comments: The cache can be resized as often as needed. Any characters in the cache when it is resized are lost. Memory used for the cache reduces the space available for label bitmaps, graphic, downloaded fonts, etc.

Some Asian fonts require an internal working buffer which is much larger than the normal cache. Since most fonts do not require this larger buffer, it is now a selectable configuration option. Printing with the Asian fonts will greatly reduce the printer memory available for labels, graphics, fonts and formats.

^CT ~CT

Change Tilde

Description: The ^CT and ~CT commands are used to change the control command prefix. The default prefix is the tilde (~).

Format: ^CTa *or* ~CTa

Parameters:

a = change control command character
Accepted Values: any ASCII character
Default Value: Parameter is required. If no value is entered, the next character received will be the new prefix character.

Example:

```
^XA
^CT+
+DGR:GRAPHIC.GRF,04412,010
^XZ
```

^CV

Code Validation

Description: The ^CV command acts as a switch to turn the code validation function *on* and *off*. When this command is turned *on*, all bar code data will be checked for the following error conditions:

- Character not in character set
- Check digit incorrect
- Data field too long (too many characters)
- Data field too short (too few characters)
- Parameter string contains incorrect data or missing parameter

When invalid data is detected, an error message and code will be printed in reverse image in place of the bar code. The message will read "INVALID - X" where "X" is one of the following error codes:

- C = Character not in character set
- E = Check digit incorrect
- L = Data field too long
- S = Data field too short
- P = Parameter (occurs only on select bar codes)

Once turned on, the ^CV command will remain active from format to format until turned off by another ^CV command or the printer is turned off. The command *is not* permanently saved.

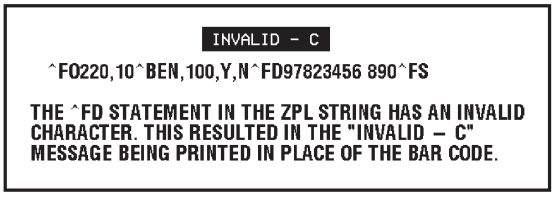
Format: ^CVa

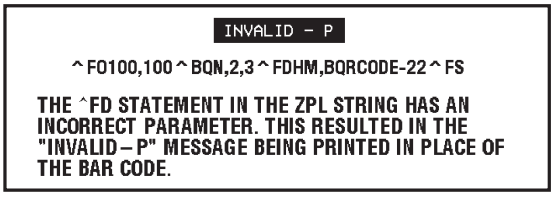
Parameters:

a = code validation
Accepted Values: Y (yes) or N (no)
Default Value: N

Example:

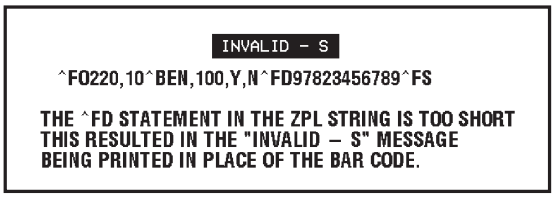
The top sample in both columns shows a correctly printed bar code. It is followed by an example of the error messages.


INVALID - C
^FO220,10^BEN,100,Y,N^FD97823456 890^FS
THE ^FD STATEMENT IN THE ZPL STRING HAS AN INVALID CHARACTER. THIS RESULTED IN THE "INVALID – C" MESSAGE BEING PRINTED IN PLACE OF THE BAR CODE.


INVALID - P
^FO100,100^BQN,2,3^FDHM,BQRCODE-22^FS
THE ^FD STATEMENT IN THE ZPL STRING HAS AN INCORRECT PARAMETER. THIS RESULTED IN THE "INVALID – P" MESSAGE BEING PRINTED IN PLACE OF THE BAR CODE.

INVALID - E
^FO220,10^BEN,100,Y,N^FD9782345678907^FS
THE ^FD STATEMENT IN THE ZPL STRING HAS AN INCORRECT CHECK DIGIT. THIS RESULTED IN THE "INVALID – E" MESSAGE BEING PRINTED IN PLACE OF THE BAR CODE.

INVALID - L
^FO220,10^BEN,100,Y,N^FD97823456789081^FS
THE ^FD STATEMENT IN THE ZPL STRING IS TOO LONG THIS RESULTED IN THE "INVALID – L" MESSAGE BEING PRINTED IN PLACE OF THE BAR CODE.


INVALID - S
^FO220,10^BEN,100,Y,N^FD97823456789^FS
THE ^FD STATEMENT IN THE ZPL STRING IS TOO SHORT THIS RESULTED IN THE "INVALID – S" MESSAGE BEING PRINTED IN PLACE OF THE BAR CODE.

Comments: If more than one error exists, the first error detected will be the one displayed.

The ^CV command tests the integrity of the data encoded into the bar code. It is not used for (or to be confused with) testing the scan-integrity of an image or bar code.

^CW

Font Identifier

Description: All built-in fonts have a one-character identifier. The ^CW command assigns a single alphanumeric character (A through Z and 0 to 9) to a font stored in DRAM, memory card, EPROM or Flash.

If the assigned character is the same as that of a built-in font, the downloaded font is used in place of the built-in font. The new font will be printed on the label wherever the format calls for the built-in font. If used in place of a built-in font, the change is only in effect until power is turned off.

If the assigned character is different, the downloaded font is used as an additional font. The assignment will remain in effect until a new command is issued or the printer turned off.

Format: ^CWa,d:o.x

Parameters:

a = letter of existing font to be substituted, or new font to be added
Required is a one-character entry.

d = destination of device to store font in (optional)
Accepted Values: E:, B:, R:, Z:
Default: R:

o = name of the downloaded font to be substituted for the built-in, or as an additional font (1 to 8 alphanumeric characters)
Accepted Values: any name up to 8 characters
Default: If no name is entered, UNKNOWN is used.

x = 3-character extension
Fixed: .FNT

Example:

To use MYFONT.FNT stored in DRAM whenever a format calls for Font A:

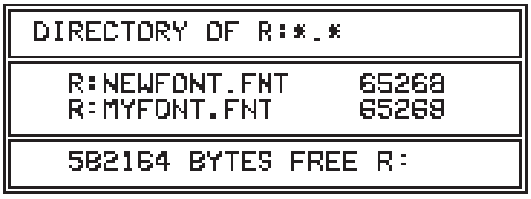
```
^XA^CWA,R:MYFONT.FNT^XZ
```

To use MYFONT.FNT stored in DRAM as additional Font Q:

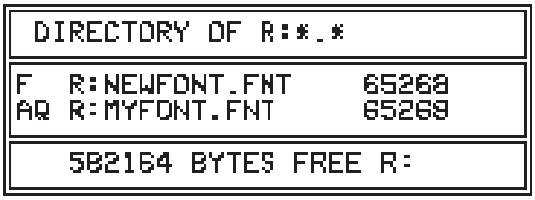
```
^XA^CWQ,R:MYFONT.FNT^XZ
```

To use NEWFONT.FNT stored in DRAM whenever a format calls for font F:

```
^XA^CWF,R:NEWFONT.FNT^XZ
```



Label listing Before Assignment



Label Listing After Assignment

~DB

Download Bitmap Font

Description: The ~DB command sets the printer to receive a downloaded bitmap font, defines native cell size, baseline, space size, and copyright.

This command consists of two portions, a ZPL II command which defines the font and a structured data segment which defines each character of the font.

Format: ~DBd:o.x,a,h,w,base,space,#char,©,data

Parameters:

d = destination drive to store font

o = name of font
Accepted Values: 1 to 8 alphanumeric characters
Default Value: UNKNOWN.FNT

x = extension
Fixed: .FNT

a = orientation of native font
Fixed: Normal

h = maximum height of cell (in dots)

w = maximum width of cell (in dots)

base = dots from top of cell to character baseline

space = width of space or non-existent characters

#char = number of characters in font
Maximum characters allowed is 256. This must match the number of characters being downloaded.

© = copyright holder
Maximum length of text string is 63 characters.

\ data = structured ASCII data that defines each character in the font
The # symbol signifies character code parameters which are separated with periods. The character code is from 1 to 4 characters to allow for large international character sets to be downloaded to the printer.

The data structure is:

#xxxx.h.w.x.y.i.data

#xxxx = character code
h = bitmap height (in dot rows)
w = bitmap width (in dot rows)
x = x-offset (in dots)
y = y-offset (in dots)
i = typesetting motion displacement (width including inter-character gap of a particular character in the font)
data = hexadecimal bitmap description

Example:

The following is an example of how to use the ~DB command. It shows the first two characters of a font being downloaded to DRAM.

```
~DBR:TIMES.FNT,N,5,24,3,10,2,ZEBRA 1992,

#0025.5.16.2.5.18.
OOFF
OOFF
FFOO
FFOO
FFFF
#0037.4.24.3.6.26.
OOFFOO
OFOOFO
OFOOFO
OOFFOO
```

~DE

Download Encoding

Description: The standard encoding for TrueType® Windows™ fonts is always Unicode. Therefore, the ZPL field data must be converted from some other encoding to Unicode. The required translation table is downloaded with the ~DE command. These tables are provided with ZTools for Windows.

Format: ~DEn,s,data

Parameters:

n = table name
Accepted Values: A destination indicator (any non-volatile RAM device) followed by the table name, up to 8 characters.
Default Value: If a name is not entered, UNKNOWN is used.

s = table size
Accepted Values: The number of memory bytes required to hold the Zebra downloadable format of the font.
Default Value: If an incorrect value or no value is entered, the command is ignored.

data = data string
Accepted Values: a string of ASCII hexadecimal values.
Default Value: If no data is entered, the command is ignored.

Example:

```
~DER:JIS.DAT,27848,300021213001...
```

(27848 2-digit hexadecimal values)

Comments: For more information on ZTools for Windows, refer to the program documentation included with the software.

^DF

Download Format

Description: The ^DF command saves ZPL II format commands as text strings to be later merged using ^XF with variable data. The format to be stored may contain Field Number (^FN) commands to be referenced when recalled.

While use of stored formats will reduce transmission time, no formatting time is saved – this command saves ZPL II as text strings formatted at print time.

If the image name is omitted, the name and extension UNKNOWN.ZPL will be used. Enter the ^DF stored format command immediately after the ^XA command, then enter the format commands to be saved.

Format: ^DFd:o.x

Parameters:

d = destination device to store image
Fixed: always a non-volatile RAM device

o = image name
Accepted Values: 1 to 8 alphanumeric characters
Default Value: If a name is not entered, UNKNOWN is used.

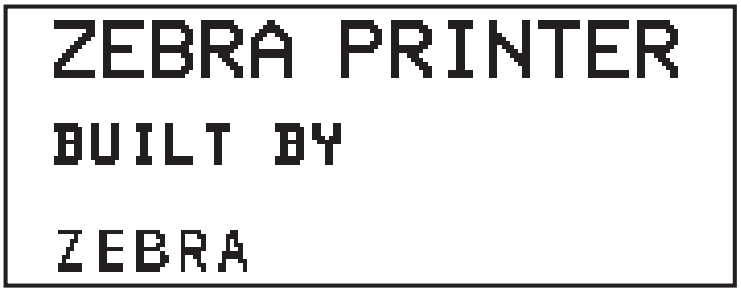
x = filename extension
Fixed: .ZPL

Example:

The following is an example of using the ^DF command to download and store ZPL II text strings to non-volatile RAM. The name used to store the text strings is STOREFMT.ZPL.

```
^XA
^DFR:STOREFMT.ZPL^FS
^FO25,25^AD,36,20^FN1^FS
^FO165,25^AD,36,20^FN2^FS
^FO25,75^AB,22,14^FDBUILT BY^FS
^FO25,125^AE,28,15^FN1^FS
^XZ
```

The sample shown below is generated by using the ^XF (Recall Format) command to recall this format.



Comments: A format containing a ^DF will not print. Results are undefined for any commands that appear prior to the ^DF in a format.

~DG

Download Graphics

Description: The ~DG (Download Graphic) command performs the following functions:

1. Puts the printer into *graphics mode*.
2. Names the graphic (this name is used to recall it into a label).
3. Defines the size of the graphic.
4. Downloads the hexadecimal string to the printer.

Format: ~DGd:o.x,t,w,data

Parameters:

d = **destination device to store image**
Accepted Values: a non-volatile RAM device
Default Value: R: (DRAM)

o = **image name**
Accepted Values: 1 to 8 alphanumeric characters
Default Value: If no name is entered, UNKNOWN is used.

x = **filename extension**
Fixed: .GRF

t = **total number of bytes in graphic**
Refer to the formula on the following page.

w = **number of bytes per row**
Refer to the formula on the following page.

data = **ASCII hexadecimal string defining image**
The *data* string defines the image and is an ASCII hexadecimal representation of the image. Each character represents a horizontal nibble of four dots.

The *t* parameter can be determined by using the following formula:

$$\frac{x \times (dots/mm)}{8\ (bits/byte)} \times (y \times (dots/mm)) = \text{total bytes}$$

where *x* is the width of the graphic in millimeters, *y* is the height of the graphic in millimeters and *dots/mm* is the print density of the printer being programmed.

For example, to determine the correct *t* parameter for a graphic 8mm wide, 16mm high and a print density of 8 dots/mm, the formula works this way:

$$\left(\frac{8 \times 8}{8}\right)^{*} \times (16 \times 8) = \text{total bytes}$$
$$8 \times 128 = 1024 \text{ bytes}$$
$$t = 1024$$

Raise any portion of a byte to the next whole byte.

The *w* parameter (the width in terms of bytes per row) can be determined by using the following formula:

$$\frac{x \times (dots/mm)}{8}^{*} = \text{total bytes per row}$$

where *x* is the width of the graphic in millimeters and *dots/mm* is the print density of the printer being programmed.

For example, to determine the correct *w* parameter for a graphic 8mm wide and a print density of 8 dots/mm, the formula works this way:

$$\frac{8 \times 8}{8} = 8 \text{ bytes}$$
$$w = 8$$

Raise any portion of a byte to the next whole byte.

Parameter *w* is the first value in the *t* calculation.

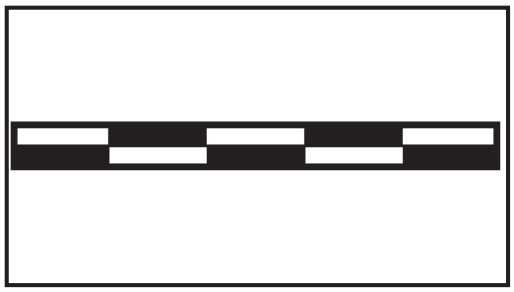
Parameter *data* is a string of hexadecimal numbers sent as a representation of the graphic image. Each hexadecimal character represents a horizontal nibble of four dots. For example, if the first four dots of the graphic image to be created should be white and the next four black, the dot by dot binary code would be 00001111. The hexadecimal representation of this binary value would be 0F. The entire graphic image is coded in this way. The complete graphic image is sent as one long continuous string of hexadecimal values.

Example:

The following is an example of using the ~DG command to load a checkerboard pattern into DRAM. The name used to store the graphic is SAMPLE.GRF.

```
~DGR:SAMPLE.GRF,00080,010,

FFFFFFFFFFFFFFFFFFFF
8000FFFF0000FFFF0001
8000FFFF0000FFFF0001
8000FFFF0000FFFF0001
FFFF0000FFFF0000FFFF
FFFF0000FFFF0000FFFF
FFFF0000FFFF0000FFFF
FFFFFFFFFFFFFFFFFFFF
```



Comments: Do not use spaces or periods when naming your graphics. Always use different names for different graphics.

If two graphics with the same name are sent to the printer, the first graphic will be erased and replaced by the second graphic.

~DN

Abort Download Graphic

Description: After decoding and printing the number of bytes in parameter *t* of the ^DG command, the printer returns to normal print mode. Graphics Mode can be aborted and normal printer operation resumed by using the ~DN (Abort Download Graphic) command.

Format: ~DN

Comments: If you need to stop a graphic from downloading, you should abort the transmission from the host device. To clear the ~DG command, however, you must send a ~DN command.

~DS

Download Scalable Font

Description: The ~DS command is used to set the printer to receive a downloadable scalable font and defines the size of the font in bytes.

The ~DS command, and its associated parameters, are the result of converting a vendor supplied font for use on a Zebra printer. The conversion is done using the Zebra utility program ZTools for Windows. The program is available from Zebra Technologies Corporation. Additionally, you cannot send an Intelifont directly to the printer; you must convert any Intelifonts using the ZTools for Windows utility.

Format: ~DSd:o.x,s,data

Parameters:

d = **destination device to store image**
Accepted Values: a non-volatile RAM device
Default Value: R: (DRAM)

o = **name of image**
Accepted Values: 1 to 8 alphanumeric characters
Default Value: if no name is entered, UNKNOWN is used.

x = **filename extension**
Fixed: .FNT

s = **size of font in bytes**
This number is generated by ZTools and should not be changed.

data = **ASCII hexadecimal string that defines font**
This number is generated by ZTools and should not be changed.

Example:

The following example shows the first three lines of a scalable font which has been converted using the ZTools for Windows program and is ready to be downloaded to the printer. If necessary, the destination and object name can be changed.

```
~DSB:CGTIMES.FNT,37080,
OOFFOOFFOOFFOOFF
FFOAECB28FFFOOFF
```

Comments: Downloaded scalable fonts are not checked for integrity. If they are corrupt, they will cause unpredictable results at the printer.

~DT

Download TrueType Font

Description: The ZTools for Windows program must be used to convert a TrueType font to a Zebra-downloadable format. This program creates a downloadable file that includes a ~DT command. Once downloaded, the font will function just like the earlier Intelifont software.

Format: ~DTf,s,data

Parameters:

f = font name
Accepted Values: A destination indicator (any non-volatile RAM device; default device is R:) followed by the TrueType name, up to 8 characters.
Default Value: If no name is entered, UNKNOWN is used.

s = font size
Accepted Values: The number of memory bytes required to hold the Zebra downloadable format of the font
Default Value: If an incorrect value or no value is entered, the command is ignored.

data = data string
Accepted Values: a string of ASCII hexadecimal values (2 hex digits/byte). The total number of 2-digit values must match *s*.
Default Value: If no data is entered, the command is ignored.

Example:

```
~DTR:FONT,52010,00AF01B0C65E...
```

(52010 2-digit hexadecimal values)

~DU

Download Unbounded TrueType Font

Description: Some international fonts have more than 256 printable characters. These fonts are supported as "Large TrueType Fonts" such as Asian fonts, and are downloaded to the printer with the ~DU command. The ZTools for Windows program must be used to convert the "Large TrueType Fonts" to a Zebra-downloadable format.

The Field Block (^FB) command cannot support the large TrueType fonts.

Format: ~DUf,s,data

Parameters:

f = font name
Accepted Values: A destination indicator (any non-volatile RAM device; default device is R:) followed by the TrueType name, up to 8 characters.
Default Value: If no name is entered, UNKNOWN is used.

s = font size
Accepted Values: The number of memory bytes required to hold the Zebra downloadable format of the font.
Default Value: If no data is entered, the command is ignored.

data = data string
Accepted Values: a string of ASCII hexadecimal values (2 hex digits/byte). The total number of 2-digit values must match *s*.
Default Value: If no data is entered, the command is ignored.

Example:

```
~DUR:KANJI,86753,60CA017B0CE7...
```

(86753 2-digit hexadecimal values)

~DY

Download Graphics

Description: ~DY downloads to the printer graphic objects in any supported format. This command can be used in place of ~DG for more saving and loading options.

Format: ~DYf,b,x,t,w,data

Parameters:

f = font name

b = format downloaded in data field (*f*)
a = uncompressed bitmap (.GRF, ASCII)
b = uncompressed bitmap (.GRF, binary)
c = AR-compressed bitmap (.GRF, compressed binary)
p = PNG image (.PNG)

x = extension of stored graphic
G = raw bitmap (.GRF)
P = store as compressed (.PNG)

t = total number of bytes in graphic
.GRF images: the size after decompression into memory.
.PNG images: the size of the .PNG file.

w = total number of bytes per row
.GRF images: number of bytes per row.
.PNG images: this data is ignored – dimensions are encoded directly into .PNG data.

data = data
ASCII hexadecimal encoding, ZB64, or binary data, depending on *b*.
a, p = ASCII hexadecimal or ZB64
b, c = binary
When binary data is sent, all control prefixes and flow control characters will be ignored until the total number of bytes needed for the graphic format is received.

Comments: Parameter *b*, option *c* is only used by Zebra's Bar-One® software.

For more information on ZB64 encoding and compression, refer to Appendix I in *Volume Two*.

~EF

Erase Stored Formats

Description: The ~EF command erases all stored formats.

Format: ~EF

Comments: The ~EF command is no longer recommended for use! It is recommended that the ^ID (Object Delete) command is used to selectively delete stored formats.

~EG

Erase Download Graphics

Description: The ~EG command is used to delete all graphic images (label format images and hexadecimal images) from DRAM. This command will erase everything in R:, E:, and B: memory.

Format: ~EG

Comments: The ~EG command is no longer recommended for use! It is recommended that the ^ID (Object Delete) command is used to selectively delete stored graphics.

^FB

Field Block

Description: The ^FB command allows you to print text into a defined "block type " format. This command formats an ^FD text string into a block of text using the origin, font, and rotation specified for the text string. This command also contains an automatic word-wrap function.

Format: ^FBa,b,c,d,e

Parameters:

a = width of text block line (in dots)
Accepted Values: 1 to the width of the label (or 9999)
Default Value: 0
If the value is less than font width or not specified, text will not print.

b = maximum number of lines in text block
Accepted Values: 1 to 9999
Default Value: 1
Text exceeding the maximum number of lines will overwrite the last line. Changing the font size will automatically increase or decrease the size of the block.

c = add or delete space between lines (in dots)
Accepted Values: -9999 to 9999
Default Value: 0
Numbers are considered to be positive unless preceded by a minus sign. Positive values add space; negative values delete space.

d = text justification
Accepted Values: L (left), C (center), R (right), J (justified)
Default Value: L
Last line is left-justified if *J* is used.

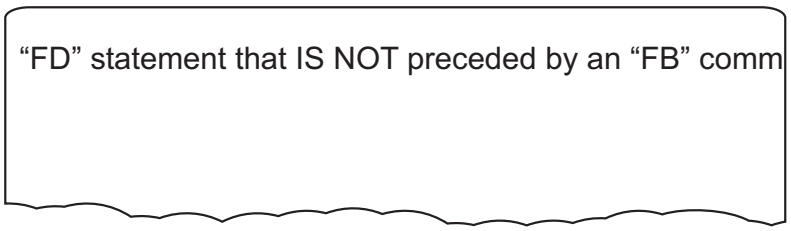
e = hanging indent (in dots)
Determines the indent of second and remaining lines.
Accepted Values: 0 to 9999
Default Value: 0

Example:

The following are examples of how the ^FB command affects the field data.

```
^XA^CF0,30,30^FO25,50
^FB250,4,,
^FD"FD" statement that IS preceded by an "FB"
command.^FS
^XZ
```

```
^XA^CF0,30,30^FO25,50
^FD"FD" statement that IS NOT preceded by an "FB"
command.^FS
^XZ
```



Comments on the ^FB Command

The following scheme can be used to facilitate special functions.

" \& " = carriage return/line feed
" \(*)" = soft hyphen (word break with a dash)
" \\ " = \ (See Item 1 below)

Item 1: ^CI13 must be selected in order to print a \.

Item 2: If a soft hyphen is placed near the end of a line, the hyphen will be printed. If it is not placed near the end of the line, it will be ignored.

(*) = Any alphanumeric character.

- If a word is too long to print on one line by itself (and no soft hyphen is specified), a hyphen will automatically be placed in the word at the right edge of the block. The remainder of the word will be on the next line. The position of the hyphen depends on word length not a syllable boundary. Placing a soft hyphen with a word controls where the hyphenation will occur.
- Maximum data string length is 3K including control characters and carriage return/line feeds.
- Normal carriage return/line feeds and "word spaces" at line breaks are discarded.
- When using ^FT (Field Typeset), ^FT uses the baseline origin of the last possible line of text. Increasing the font size will cause the text block to increase in size from bottom to top. This could cause label to print past the top of label.
- When using ^FO (Field Origin), increasing the font size will cause the text block to increase in size from top to bottom.
- If an ^SN is used instead of an ^FD, the field will not print.
- An ^FS terminates an ^FB statement. Each block requires its own ^FB command.

^FC

Field Clock (for Real Time Clock)

Description: The ^FC command is used to set the clock-indicators (delimiters) and the clock mode, for use with the Real Time Clock hardware. This command must be included within each label field command string each time the Real Time Clock values are required within the field.

Format: ^FCa,b,c

Parameters:

a = primary clock indicator character
Accepted Values: Any ASCII character
Default Value: %

b = secondary clock indicator character
Accepted Values: Any ASCII character
Default Value: none – this value cannot be the same as *a* or *c*.

c = tertiary clock indicator character
Accepted Values: Any ASCII character
Default Value: none – this value cannot be the same as *a* or *b*.

Comments: The ^FC command will be ignored if the Real Time Clock hardware is not present.

^FD

Field Data

Description: The ^FD command defines the data string for the field. The field data can be any printable character except those used as command prefixes (^ and ~).

Format: ^FDa

Parameters:

a = data to be printed
Accepted Values: any ASCII string up to 3072 characters.
Default Value: none – a string of characters must be entered.

Comments:

The ^ and ~ characters can be printed by changing the prefix characters – refer to the ~CC and ~CT commands. The new prefix characters cannot be printed.

Characters with codes above 127, or the ^ and ~ characters can be printed using the ^FH and ^FD commands.

For printing special functions, the following scheme is used:

\& = carriage return/line feed
\(*) = soft hyphen (word break with a dash)
\\ = backslash (\)

- ^CI13 must be selected in order to print a \.
- If a soft hyphen is placed near the end of a line, the hyphen will be printed. If it is not placed near the end of the line, it will be ignored.

^FH

Field Hexadecimal Indicator

Description: The ^FH command allows you to enter the hexadecimal value for any character directly into the ^FD statement. The ^FH command must precede each ^FD command in which it will be used.

Within the ^FD statement, the HEX indicator must precede each hexadecimal value. The default hexadecimal indicator is _ (underscore). There must be a minimum of two characters designated to follow the underscore. The *a* parameter can be added when a different hexadecimal indicator is needed.

This command can be used with any of the commands that have field data (i.e. ^FD, ^FV (Field Variable), and ^SN (Serialized Data)).

Valid hexadecimal characters are:

0 1 2 3 4 5 6 7 8 9 A B C D E F a b c d e f

Format: ^FHa

Parameters:

a = hexadecimal indicator
Accepted Values: any character except current format and control prefix (^ and ~ by default).
Default Value: _ (underscore)

Example:

```
^FO100,100^AD^FH^FDTilde _7e used for HEX^FS
^FO100,100^AD^FH\^FDTilde \7E used for HEX^FS
```

Both of the lines of code above will print the following result:

^FM

Multiple Field Origin Locations

Description: The ^FM command allows you to control the placement of bar code symbols.

It designates field locations for the PDF417 (^B7) and Micro-PDF417 (^BF) bar codes when the structured append capabilities are utilized. This allows printing multiple bar codes from the same set of text information.

The structured append capability is a way of extending the text printing capacity of both bar codes. If a string extends beyond what the data limitations of the bar code are, it can be printed as a series: 1 of 3, 2 of 3, 3 of 3. Scanners will read the information and reconcile the information into the original, unsegmented text.

The ^FM command triggers multiple bar code printing on the same label *with ^B7 and ^BF only*. When used with any other commands, it will be ignored.

Format: ^FMx1,y1,x2,y2,...

Parameters:

x1 = x-axis location of first symbol (in dots)
Accepted Values:
0 to 32000
e = exclude this bar code from printing
Default Value: none – a value must be entered.

y1 = y-axis location of first symbol (in dots)
Accepted Values:
0 to 32000
e = exclude this bar code from printing
Default Value: none – a value must be entered.

x2 = x-axis location of second symbol (in dots)
Same as *x1* parameter

y2 = y-axis location of second symbol (in dots)
same as *y1* parameter

… = continuation of X,Y pairs
Maximum number of pairs: 60

Examples:

This example assumes a *maximum* of three bar codes:

```
^FM100,100,200,200,300,300^B7N,5,5,,83,N^FD<data>^FS
```

Bar code 1 is at position 100, 100
Bar code 2 is at position 200, 200
Bar code 3 is at position 300, 300

This example assumes a *maximum* of three bar codes, with bar code 2 of 3 omitted:

```
^FM100,100,e,e,300,300^B7N,5,5,,83,N^FD<data>^FS
```

Bar code 1 is at position 100, 100
Bar code 2 is excluded
Bar code 3 is at position 300, 300

If *e* is entered for any of the *x*, *y* values, the bar code will not print. Symbol 2 of 3 in this example will still be excluded.

```
^FM100,100,200,e,300,300^B7N,5,5,,83,N^FD<data>^FS
```

Comments: The number of the x,y pairs must match the number of bar codes generated. If too few are designated, no symbols will print. If too many are designated the symbols will print, but code validation (^CV) will generate an error message (if activated).

^FN

Field Number

Description: The ^FN command is used to number data fields. This command is used in both Store Format (^DF) and Recall Format (^XF) operations. Refer to the example on the following page to see how ^FN is used with ^DF.

In a stored format, the ^FN command is used where you would normally use the ^FD (Field Data) command. In recalling the stored format, use ^FN in conjunction with the ^FD (Field Data) command.

Format: ^FN#

Parameters:

= **number to be assigned to the field**
Accepted Values: 1 to 9999
Default Value: none

Example:

```
^XA
^DFR:STOREFMT.ZPL^FS
^FO25,25^AD,36,20^FN1^FS
^FO165,25^AD,36,20^FN2^FS
^FO25,75^AB,22,14^FDBUILT BY^FS
^FO25,125^AE,28,15^FN1^FS
^XZ

^XA
^XFR:STOREFMT.ZPL^FS
^FN1^FDZEBRA^FS
^FN2^FDLABEL^FS
^XZ
```

Comments:

- The same ^FN value can be stored with several different fields.
- If a label format contains a field with the ^FN command and the ^FD command, the data in that field will be printed for any other field containing the same ^FN value.

^FO

Field Origin

Description: The ^FO command sets a field origin, relative to the label home (^LH) position. ^FO sets the upper-left corner of the field area by defining points along the x-axis and y-axis independent of the rotation.

Format: ^FOx,y

Parameters:

x = x-axis location (in dots)
Accepted Values: 0 to 32000
Default Value: 0

y = y-axis location (in dots)
Accepted Values: 0 to 32000
Default Value: 0

Comments: If the value entered for the *x* or *y* parameter is too high, it could position the field origin completely off the label.

^FP

Field Parameter

Description: The ^FP command allows vertical formatting of the font field, which is commonly used for Asian fonts.

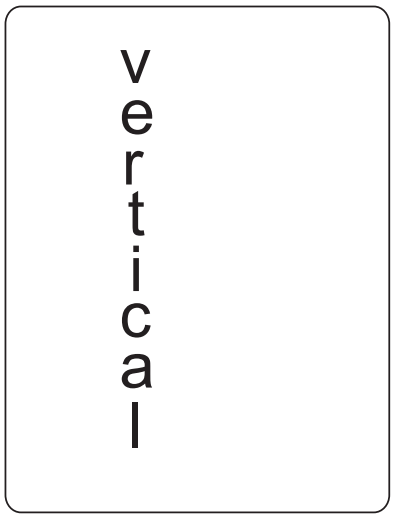
Format: ^FPd,g

Parameters:

d = direction
Accepted Values:
H = horizontal printing (left to right)
V = vertical printing (top to bottom)
R = reverse printing (right to left)

g = additional inter-character gap (in dots)
Accepted Values: 0 to 9999

Example:




```
^XA
^FO100,50^FPV,10^AG^FDvertical^FS
^XZ
```

```
^XA
^FO350,50^FPR,10^AG^FDreverse^FS
^XZ
```

Comments: When using reverse printing, the origin specified in ^FT is the lower-left corner of the right-most text character.

^FR

Field Reverse Print

Description: The ^FR command allows a field to appear as white over black or black over white. When printing a field and the ^FR command has been used, the color of the output is the reverse of its background.

Format: ^FR

Parameters:

^FR = field reverse print

Example:

```
^XA
^FO100,60
^GB380,203,203^FS
^FO180,110
^CFG^FR^FDFIELD^FS
^FO130,170
^FR^FDREVERSE^FS
^XZ
```

Comments: The ^FR command applies to only one field and has to be specified each time. When multiple ^FR commands are going to be used, it may be more convenient to use the ^LR command.

^FS

Field Separator

Description: The ^FS command denotes the end of the field definition. Alternatively, the field separator command can also be issued as a single ASCII control code SI (Control-O, HEX 0F).

Format: ^FS

Parameters:

^FS = field separator

^FT

Field Typeset

Description: The ^FT command also sets the field position, relative to the home position of the label designated by the ^LH command. The typesetting origin of the field is fixed with respect to the contents of the field and does not change with rotation.

Format: ^FTx,y

Parameters:

x = x-axis location (in dots)
Accepted Values: 0 to 32000
Default Value: position after last formatted text field

y = y-axis location (in dots)
Accepted Values: 0 to 32000
Default Value: position after last formatted text field

Text – Origin is the start of the character string, at the baseline of the font. Normally the baseline is the bottom of most characters except for those with descenders such as ‘g’, ‘y’, etc.

Bar Codes – The origin is the base of the bar code, even when an interpretation is present below the bar code, or if the bar code has guard bars.

Graphic Boxes – Origin is at the bottom-left corner of the box.

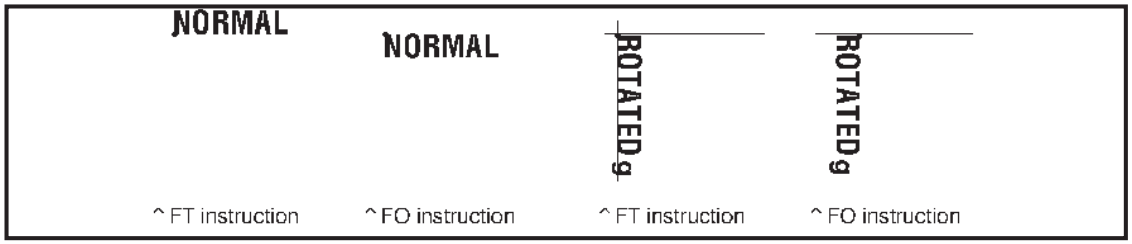
Images – Origin is at the bottom-left corner of the rectangular image area.

Example:

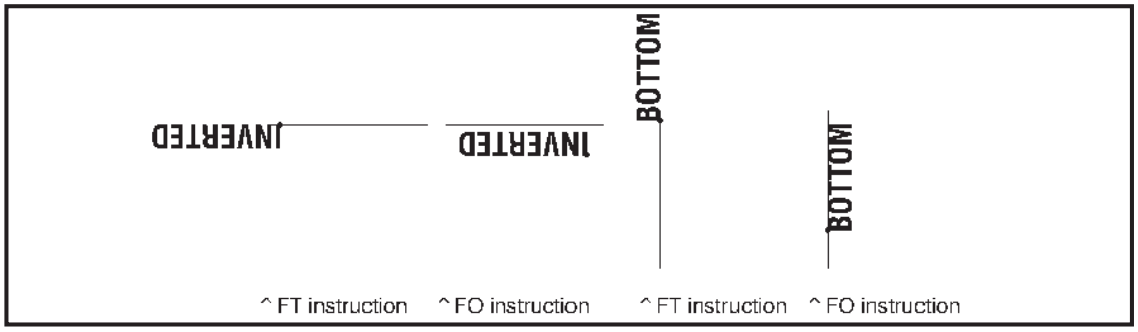
The example below shows the differences in font orientation when using ^FT and ^FO relative to their ^LH position. The origin point of the font when using the ^FT command is always at the left of the baseline position of the first element or character in the field.

In normal orientation, all characters rest on the baseline. In rotated orientation, all characters are drawn to the right of the label from the baseline. In inverted orientation, all characters are drawn down from the baseline and are printed to the left. In bottom orientation, all characters are drawn towards the left of the label from the baseline and printed to the right. The "dot" shows the origin point for both the ^FT and ^FO font orientations.

Scalable Normal Font Orientation, Scalable Rotated Font Orientation



Scalable Inverted Font Orientation, Scalable Bottom-up Font Orientation



Comments: When a coordinate is missing, the position following the last formatted field is assumed. This "remembering" simplifies field positioning with respect to other fields. Once the first field is positioned, other fields will follow automatically.

There are several instances where using the ^FT command without specifying *x* and *y* parameters is not recommended.

- When positioning the first field in a label format.
- At any time with the ^FN (Field Number) command.
- Following a ^SN (Serialization Data) command.

^FV

Field Variable

Description: ^FV replaces the ^FD (field data) command in a label format when the field is variable.

Format: ^FV

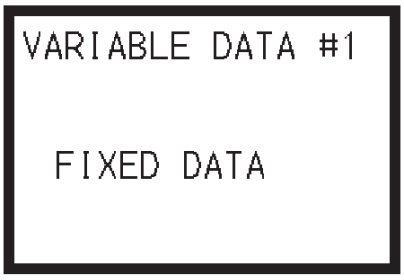
Parameters:

a = variable field data to be printed
Accepted Values: 0 to 3072 character string
Default Value: if no data is entered, the command is ignored.

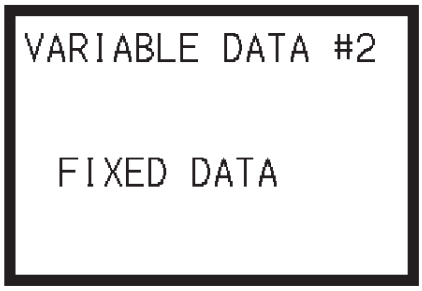
Example:

The following is an example of how to use the ^MC and ^FV command.

```
^XA
^FO40,40^GB300,203,8^FS
^FO55,60^FVVARIABLE DATA #1^FS
^FO80,150^FDFIXED DATA^FS
^MCN^XZ
```




```
^XA
^FO55,60^FDVARIABLE DATA #2^FS
^MCY^XZ
```



Comments: ^FV fields are always cleared after the label is printed. ^FD fields are not cleared.

^FW

Field Orientation

Description: The ^FW command sets the default orientation for all command fields that have an orientation (rotation) parameter. Fields can be rotated 0, 90, 180, 270 degrees clockwise by using this command.

The ^FW command only affects fields that follow it. Once you have issued a ^FW command, the setting is retained until you turn off the printer or send a new ^FW command to the printer.

Format: ^FWr

Parameters:

r = rotate field
Accepted Value:
N = normal
R = rotated 90 degrees
I = inverted 180 degrees
B = bottom-up 270 degrees, read from bottom up
Initial Value at Power-up: N

Comments: If the ^FW command is entered with the *r* parameter missing, the command is ignored.

^FW only affects the orientation in commands where the rotation parameter has not been specifically set. If an command has a specific rotation parameter, that is the one that is used.

^FX

Comment

Description: The ^FX command is useful when you want to add a “non-printing” informational comment or statement within a label format. Any data after the ^FX command up to the next caret (^) or tilde (~) command will not have any effect on the label format. Therefore, you should avoid using the caret (^) or tilde (~) commands within the ^FX statement.

Format: ^FXc

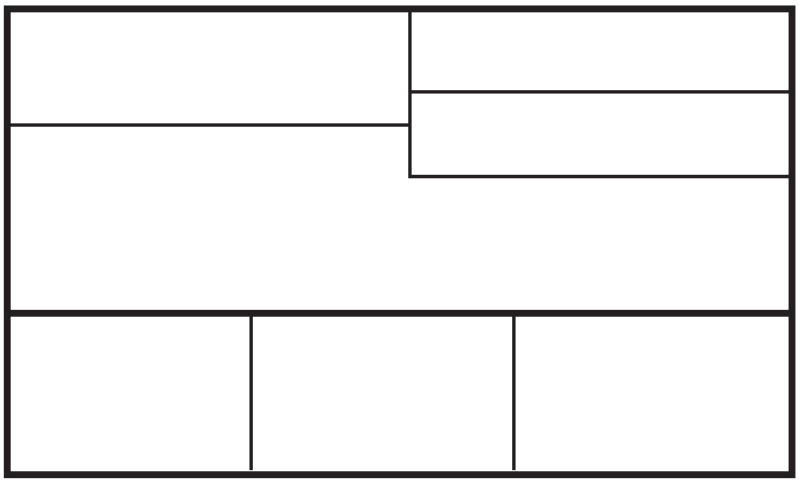
Parameters:

c = non-printing comment

Example:

The following is an example of how effectively to use the ^FX command.

```
^XA
^LH100,100^FS
^FXSHIPPING LABEL^FS
^FO10,10^GB470,280,4^FS
^FO10,190^GB470,4,4^FS
^FO10,80^GB240,2,2^FS
^FO250,10^GB2,100,2^FS
^FO250,110^GB226,2,2^FS
^FO250,60^GB226,2,2^FS
^FO156,190^GB2,95,2^FS
^FO312,190^GB2,95,2^FS
^XZ
```



Comments: Proper usage of the ^FX command includes following it with the ^FS command.

^GB

Graphic Box

Description: The ^GB command is used to draw boxes and/or lines as part of a label format. Boxes and lines are use to highlight important information, divide labels into distinct areas, or just dress up the way the label looks. The same format command is used for drawing either boxes or lines.

Format:^GBw,h,t,c,r

Parameters:

w = box width (in dots)
Accepted Values: value of *t* to 32000
Default Value: value used for thickness (*t*) or 1

h = box height (in dots)
Accepted Values: value of *t* to 32000
Default Value: value used for thickness (*t*) or 1

t = border thickness (in dots)
Accepted Values: 1 to 32000
Default Value: value used for thickness (*t*) or 1

c = line color
Accepted Values: B (black) or W (white)
Default Value: B

r = degree of corner-rounding
Accepted Values: 0 (no rounding) to 8 (heaviest rounding)
Default Value: 0

For the *w* and *h* parameters, keep in mind that printers will have a default of 6, 8, 12, or 24 dots/millimeter. This comes out to 153, 203, 300, or 600 dots per inch. To determine the values for *w* and *h*, calculate the dimensions in millimeters and multiply by 6, 8, 12, or 24.

If the width and height are not specified, you will get a solid box with its width and height as specified by value *t*.

The roundness-index is used to determine a rounding-radius for each box. Formula:

rounding-radius = (rounding-index / 8) * (shorter side / 2)

where the shorter side is the lesser of the width and height (after adjusting for minimum and default values).

Examples:

Width: 1.5 inch; Height: 1 inch; Thickness: 10; Color: default; Rounding: default

```
^XA
^FO150,100
^GB305,203,10
^XZ
```

Width: 0 inch; Height: 1 inch; Thickness: 20; Color: default; Rounding: default

```
^XA
^FO150,100
^GB0,203,20
^XZ
```

Width: 1 inch; Height: 0 inch; Thickness: 30; Color: default; Rounding: default

```
^XA
^FO150,100
^GB203,0,30
^XZ
```

Width: 1.5 inch; Height: 1 inch; Thickness: 10; Color: default; Rounding: 5

```
^XA
^FO150,100
^GB305,203,10,,5
^XZ
```

^GC

Graphic Circle

Description: The ^GC command produces a circle on the printed label. The command parameters specify the diameter (width) of the circle, outline thickness, and color. Thickness extends inward from the outline.

Format: ^GCd,t,c

Parameters:

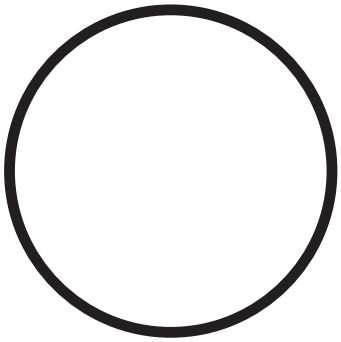
d = circle diameter (in dots)
Accepted Values: 3 to 4095 (larger values are replaced with 4095)
Default Value: 3

t = border thickness (in dots)
Accepted Values: 2 to 4095
Default Value: value used for thickness (*t*) or 1

c = line color
Accepted Values: B (black) or W (white)
Default Value: B

Example: The following code will generate a label image similar to the one seen below.

```
^XA
^FO100,100
^GC250,10,B^FS
^XZ
```



^GD

Graphic Diagonal Line

Description: The ^GD command produces a straight diagonal line connecting one corner with the opposite corner of a box closing this line.

Format:^GBw,h,t,c,r

Parameters:

w = box width (in dots)
Accepted Values: 3 to 32000
Default Value: value of *t* (thickness) or 1

h = box height (in dots)
Accepted Values: 3 to 32000
Default Value: value of *t* (thickness) or 1

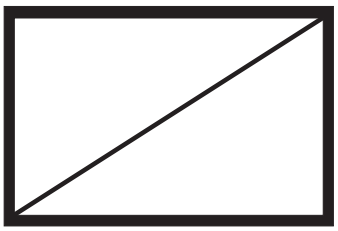
t = border thickness (in dots)
Accepted Values: 1 to 32000
Default Value: value of *t* (thickness) or 1

c = line color
Accepted Values: B (black) or W (white)
Default Value: B

o = orientation – direction of the diagonal
Accepted Values:
R (or /) = right-leaning diagonal
L (or \) = left-leaning diagonal
Default Value: R

Example: The following code will generate a label image similar to the one seen below.

```
^XA
^FO150,100^GB350,
203,10^FS
^FO155,110^GD330,
183,10,,R^FS
```



^GE

Graphic Ellipse

Description: The ^GE command will produce an ellipse in the label format.

Format: ^GEw,h,t,c

Parameters:

w = **ellipse width (in dots)**
Accepted Values: 3 to 4095 (larger values are replaced with 4095)
Default Value: value used for thickness (*t*) or 1

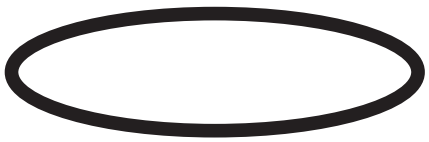
h = **ellipse height (in dots)**
Accepted Values: 3 to 4095
Default Value: value used for thickness (*t*) or 1

t = **border thickness (in dots)**
Accepted Values: 2 to 4095
Default Value: value used for thickness (*t*) or 1

c = **line color**
Accepted Values: B (black) or W (white)
Default Value: B

Example: The following code will generate a label image similar to the one seen below.

```
^XA
^FO100,100
^GE300,100,10,B^FS
^XZ
```



^GF

Graphic Field

Description: The ^GF command allows you to download graphic field data directly into the bitmap. This command follows the conventions for any other field, meaning a field orientation is included. The graphic field data can be placed at any location within the bitmap space.

Format: ^GFa,b,c,d,data

Parameters:

a = compression type
Accepted Values:
A = ASCII hexadecimal (follows the format for other download commands)
B = binary (data sent after the *c* parameter is strictly binary)
C = compressed binary (data sent after the *c* parameter is in compressed binary format. The data is compressed on the host side using Zebra's compression algorithm. The data is then decompressed and placed directly into the bitmap.)
Default Value: A

b = binary byte count
Accepted Values: 1 to 99999
This is the total number of bytes to be transmitted for the total image or the total number of bytes that follow parameter *d*. For ASCII download the parameter should match parameter *c*. Out-of-range values are set to the nearest limit.
Default Value: none – command is ignored if a value is not specified.

c = graphic field count
Accepted Values: 1 to 99999
This is the total number of bytes comprising graphic format (width x height), which is sent as parameter *d*. Count divided by bytes per row gives the number of lines in the image. This number represents the size of the image, not necessarily the size of the data stream (see *d*).
Default Value: none – command is ignored if a value is not specified.

d = bytes per row
Accepted Values: 1 to 99999
This is the number of bytes in the download data that comprise one row of the image.
Default Value: none – command is ignored if a value is not specified.

data = data

Accepted Values:

ASCII hexadecimal data: 00 to FF

A string of ASCII hexadecimal numbers, 2 digits per image byte. CR and LF can be inserted as needed for readability. The number of 2-digit number pairs must match the above count. Any numbers sent after count is satisfied are ignored. A comma in the data will pad the current line with "00" (white space), thereby allowing minimization of data sent. ~DN or any caret or tilde character prematurely aborts the download.

Binary data: Strictly binary data is sent from the host. All control prefixes will be ignored until the total number of bytes needed for the graphic format is sent.

Example:

This example will download 8,000 total bytes of data and place the graphic data at location 100,100 of the bitmap. The data sent to the printer is in ASCII form.

```
^FO100,100^GFA,8000,8000,80,<ASCII data>
```

This example will download 8,000 total bytes of data and place the graphic data at location 100,100 of the bitmap. The data sent to the printer is in binary form.

```
^FO100,100^GFB,8000,8000,80,Binary data
```

^GS

Graphic Symbol

Description: The ^GS command enables you to generate the registered trademark, copyright symbol, and other symbols.

Format: ^GSo,h,w

Parameters:

o = font orientation
Accepted Values:
N = normal
R = rotate 90 degrees clockwise
I = inverted 180 degrees
B = bottom-up, 270 degrees
Default Value: N or last ^FW value

h = character height proportional to width (in dots)
Default Value: last ^CF value

w = character width proportional to height (in dots)
Default Value: last ^CF value

Example:

Use the ^GS command, then use ^FD and the appropriate character (A through E) within the field data statement to generate the character you want:

A = ® (Registered Trade Mark)
B = © (Copyright)
C = TM (Trade Mark)
D = (Underwriters Laboratories approval)
E = (Canadian Standards Association approval)

```
^XA^CFD
^FO50,50^FDZEBRA PROGRAMMING^FS
^FO50,75^FDLANGUAGE II (ZPL II )^FS
^FO280,75^GS^FDC
^XZ
```

ZEBRA PROGRAMMING
LANGUAGE II (ZPL II™)

~HB

Battery Status

Description: When the ~HB command is sent to the Zebra printer, a data string is sent back to the Host. The string starts with an <STX> control code sequence and is terminated by an <ETX><CR><LF> control code sequence.

Format: ~HB

Parameters: when the printer receives the command it will return:

```
<STX>bb.bb,hh.hh,bt<ETX><CR><LF>
```

<STX>	=	ASCII start-of-text character
bb.bb	=	current battery voltage reading to the nearest ¼ volt.
hh.hh	=	current head voltage reading to the nearest ¼ volt
bt	=	battery temperature in Celsius
<ETX>	=	ASCII end-of-text character
<CR>	=	ASCII carriage return
<LF>	=	ASCII line feed character

Comments: This command is used for the power-supply battery of the printer and is not to be confused with battery backed-up RAM.

^HG

Host Graphic

Description: The ^HG command is used to upload graphics to the host. The graphic image can be stored for future use, or it can be downloaded to any Zebra printer.

Format: ^HGn

Parameters:

n = name of the graphic

Comments: For more information on uploading graphics, refer to the ^HY command.

~HI

Host Identification

Description: The ~HI command is designed to be sent from the host to the Zebra printer to retrieve information. Upon receipt, the printer will respond with information on the model, software version, dots-per-millimeter setting, memory size, and any detected objects.

Format: ~HI

Parameters: when the printer receives this command it will return:

```
XXXXXX,V1.0.0,12,512KB,X
```

XXXXXX = **model of Zebra printer**

V1.0.0 = **version of software**

12 = **dots/mm**
6,8,12,24 dots/mm printheads

512KB = **memory**
512KB = ½ MB
1024KB = 1 MB
2048KB = 2 MB
4096KB = 4 MB
8192KB = 8 MB

x = **recognizable objects**
only options specific to printer will be shown (cutter, options, etc.)

~HM

Host Memory Status

Description: Sending the ~HM to the printer immediately returns a memory status message to the host. Use this command whenever you need to know the status of the memory.

When ~HM is sent to the Zebra printer, a line of data containing information on the total amount, maximum amount, and available amount of memory is sent back to the host.

Format: ~HM

Parameters: When ~HM is sent to the printer, a line of data containing three numbers is sent back to the host. For example:

```
1024,0780,0780
```

The first value is the total amount of RAM (Random Access Memory) installed in the printer. This number is in kilobytes. In this example, the printer has 1024K RAM installed.

The second value is the maximum amount of RAM available to the user. This number is in kilobytes. In this example, the printer has a maximum of 780K RAM available.

The third value is the amount of RAM currently available to the user. This number is in kilobytes. In this example, there is 780K of RAM in the printer currently available to the user.

Comments: Memory taken up by bitmaps is included in the currently available memory value (due to ^MCN).

Downloading a graphic image, fonts, or saving a bitmap only affects the amount of RAM. The total amount of RAM and maximum amount of RAM will not change after the printer is turned on.

~HS

Host Status Return

Description: When ~HS is sent to the printer, three data strings are sent back to the Host. Each string starts with an <STX> control code and is terminated by an <ETX><CR><LF> control code sequence. To avoid confusion, each string will be printed on a separate line by the host.

String 1

```
<STX>aaa,b,c,dddd,eee,f,g,h,iii,j,k,l<ETX><CR><LF>
```

aaa	=	communication (interface) settings*
b	=	paper out flag (1 = paper out)
c	=	pause flag (1 = pause active)
dddd	=	label length (value in number of dots)
eee	=	number of formats in receive buffer
f	=	"buffer full" flag (1 = receive buffer full)
g	=	"communications diagnostic mode" flag (1 = diagnostic mode active)
h	=	"partial format" flag (1 = partial format in progress)
iii	=	unused (always 000)
j	=	"corrupt RAM" flag (1 = configuration data lost)
k	=	temperature range (1 = under temperature)
l	=	temperature range (1 = over temperature)

*This parameter specifies the printer's baud rate, number of data bits, number of stop bits, parity setting and type of handshaking. This value is a 3-digit decimal representation of an 8-bit binary number. To evaluate this parameter, first convert the decimal number to a binary number. The 9-digit binary number is read according to the following table:

aaa = a^8 a^7 a^6 a^5 a^4 a^3 a^2 a^1 a^0	
a^7 = Handshake 0 = Xon/Xoff 1 = DTR	a^8 a^2 a^1 a^0 = Baud 0 000 = 110 0 001 = 300 0 010 = 600 0 011 = 1200 0 100 = 2400 0 101 = 4800 0 110 = 9600 0 111 = 19200 1 000 = 28800 *(available only on certain printer models)* 1 001 = 38400 *(available only on certain printer models)* 1 010 = 57600 *(available only on certain printer models)* 1 011 = 14400
a^6 = Parity Odd/Even 0 = Odd 1 = Even	
a^5 = Disable/Enable 0 = Disable 1 = Enable	
a^4 = Stop Bits 0 = 2 Bits 1 = 1 Bit	
a^3 = Data Bits 0 = 7 Bits 1 = 8 Bits	

String 2

```
<STX>mmm,n,o,p,q,r,s,t,uuuuuuuu,v,www<ETX><CR><LF>
```

mmm	=	function settings*
n	=	unused
o	=	“head up” flag (1 = head in *up* position)
p	=	“ribbon out” flag (1 = ribbon out)
q	=	“thermal transfer mode” flag (1 = thermal trans. mode selected)
r	=	print mode 0 = rewind 1 = peel off 2 = tear off 3 = cutter 4 = applicator
s	=	print width mode
t	=	“label waiting” flag (1 = label waiting in peel-off mode)
uuuuuuuu	=	labels remaining in batch
v	=	“format while printing” flag (always 1)
www	=	number of graphic images stored in memory

* This parameter specifies the Printer’s media type, sensor profile status, and communication diagnostics status. As in String 1, this is a 3-digit decimal representation of an 8-bit binary number. First, convert the decimal number to a binary number. The 8-digit binary number is read according to the following table:

mmm = m7 m6 m5 m4 m3 m2 m1 m0	
m7 = Media Type 0 = Die-Cut 1 = Continuouse	m4 m3 m2 m1 = Unused 0 = Off 1 = On
m6 = Sensor Profile 0 = Off	m0 = Print Mode 0 = Direct Thermal 1 = Thermal Transfer
m5 = Communications Diagnostics 0 = Off 1 = On	

String 3

```
<STX>xxxx,y<ETX><CR><LF>
```

xxxx	=	password
y	=	0 (static RAM not installed) 1 (static RAM installed)

~HU

Host Unsolicited

Description: This command will return the table of configured ZebraNet ALERT settings to the host.

Format: ~HU

Example:

If the ~HU command is sent to the printer with existing ALERT messages set to go to e-mail and SNMP traps, the data returned would look something like the information below. Refer to ^SX for complete information on parameter settings.

```
B,C,Y,Y,ADMIN@COMPANY.COM,0
J,F,Y,Y,,0
C,F,Y,Y,,0
D,F,Y,Y,,0
E,F,Y,N,,0
F,F,Y,N,,0
H,C,Y,N,ADMIN@COMPANY.COM,0
N,C,Y,Y,ADMIN@COMPANY.COM,0
O,C,Y,Y,ADMIN@COMPANY.COM,0
P,C,Y,Y,ADMIN@COMPANY.COM,0
```

The first line indicates that condition B (ribbon out) is routed to destination C (e-mail address). The next two characters, Y and Y, indicate that the “condition set” and “condition clear” options have been set to *yes*. The next entry is the destination that the ALERT e-mail should be sent to; in this example it is *admin@company.com*. The last figure seen in the first line is 0, which is the port number.

Each line shows the settings for a different ALERT condition as defined in the ^SX command.

^HW

Host Directory List

Description: ^HW is used to transmit a directory listing of objects in a specific memory area (storage device) back to the host device. This command will return a formatted ASCII string of object names to the host.

Each object is listed on a line and has a fixed length. The total length of a line is also fixed. Each line listing an object begins with the asterisk (*) followed by a blank space. There are then eight spaces for the object name, a period and three spaces for the extension. The extension is followed by two blank spaces, then six spaces for the object size, two blank spaces and three spaces for option flags (reserved for future use). The format looks like this:

```
<STX><CR><LF>
DIR R:   <CR><LF>
*Name.ext(2sp.)(6 obj. sz.)(2sp.)(3 option flags)
*Name.ext(2sp.)(6 obj. sz.)(2sp.)(3 option flags)
<CR><LF>
-xxxxxxx bytes free
<CR><LF>
<ETX>
```

<STX> = start of text
<CR><LR> = carriage return/line feed
<ETX> = end on text

The command may be used in a stand-alone type file to be issued to the printer at any time. The printer will return the directory listing as soon as possible, based on other tasks it may be performing when the command is received.

This command, like all ^ (caret) commands, is processed in the order that it is received by the printer.

Format: ^HWd:o.x

Parameters:

d = location to retrieve object listing
Accepted Values: E:, B:, R:
Default Value: DRAM

o = object name
Accepted Values: any 1 to 8 character name
Default Value: asterisk (*). A question mark (?) can also be used.

x = extension
Accepted Values: any valid 3-letter extension
Default Value: asterisk (*). A question mark (?) can also be used.

Example:

Listed is an example of the ^HR command to retrieve information from R:.

```
^XA^HWR:*.*^XZ
```

The printer returned the following information as the Host Directory Listing:

```
-DIR R:*.*

*R:ARIALN1.FNT 49140
*R:ARIALN2.FNT 49140
*R:ARIALN3.FNT 49140
*R:ARIALN4.FNT 49140
*R:ARIALN.FNT 49140
*R:ZEBRA.GRF 8420

-794292 bytes free R:RAM
```

^HY

Upload Graphics

Description: The ^HY command is an extension of the ^HG command. ^HY is used to upload graphic objects from the printer in any supported format.

Format: ^HYd:o.x

Parameters:

d = location of object
Accepted Values: E:, R:, B:
Default Value: search priority

o = object name
Accepted Values: any existing object
Default Value: an object name must be specified

x = extension
Accepted Values:
G = .GRF (raw bitmap format)
P = .PNG (compressed bitmap format)
Default Value: format the image is stored in

Comments: The image is uploaded in the form of a ~DY command. The data field of the returned ~DY command will always be encoded in the ZB64 format.

^HZA

Display All Description Information

Description: The ^HZA command is used for returning complete printer description information in XML. The printer will return information on format parameters, object directories, and print status. Refer to Chapter 6 (XML: Super Host Status) in *Volume Two* for more information.

Format: ^HZA

^HZF

Format Parameter Setting Information

Description: This command will return the printer's format parameter setting information in XML. Data returned displays the current settings in XML format. Refer to Chapter 6 (XML: Super Host Status) in *Volume Two* for more information.

Format: ^HZF

^HZL

Object Directory Listing Information

Description: The ^HZL command will return the printer's object directory information in XML. Refer to Chapter 6 (XML: Super Host Status) in *Volume Two* for more information.

Format: ^HZL

^HZO

Individual Object Data Information

Description: The ^HZO command will return object data from the printer. Refer to Chapter 6 (XML: Super Host Status) in *Volume Two* for more information.

Format: ^HZO,n

Parameters:

n = name of the object to be recalled
Objects can be recalled from R:, B: or E:.
The object name and extension follow the standard Zebra naming convention. The name is 1 to 8 hexadecimal characters followed by a three-character extension.

Some supported extensions are:
- fonts = .FNT
- graphics = .GRF
- compressed graphics = .PNG
- formats = .ZPL
- encoding tables = .DAT
- downloadable objects = .ZOB
- unsolicited error data files = .STO

^HZR

Status Information

Description: The ^HZR command returns status information from the printer. Refer to Chapter 6 (XML: Super Host Status) in *Volume Two* for more information.

Format: ^HZR

^ID

Object Delete

Description: The ^ID command deletes objects, graphics, fonts, and stored formats from storage areas selectively or in groups. This command can be used within a printing format to delete objects prior to saving new ones, or it can be used in a stand-alone format to delete objects.

The image name and extension support the use of the asterisk (*) as a wildcard. This allows for easy deletion of selected groups of objects.

Format: ^IDd:o.x

Parameters:

d = device location of stored object
Accepted Values: E:, B:, R:
Default Value: R:

o = object name
Accepted Values: any 1 to 8 character name
Default Value: If no name is entered, UNKNOWN is used.

x = extension
Accepted Values: any valid 3-letter extension
Default Value: .GRF

Example:

To delete stored formats from DRAM:

```
^XA^IDR:*.ZPL^XZ
```

To delete formats and images named SAMPLE from DRAM, regardless of the extension:

```
^XA^IDR:SAMPLE.*^XZ
```

To delete the image SAMPLE1.GRF prior to storing SAMPLE2.GRF:

```
^XA
^FO25,25^AD,18,10^FDDelete^FS
^FO25,45^AD,18,10^FDthen Save^FS
^IDR:SAMPLE1.GRF^FS
^ISR:SAMPLE2.GRF^FS
^XZ
```

In this example, the * is a wild card, indicating that *all* objects with the .GRF extension will be deleted.

```
^XA^IDR:*.GRF^XZ
```

Comments: When an object is deleted from R:, the object can no longer be used and memory is available for other uses. This applies only to R:.

When Flash memory is being used (B: and E:), the Flash Defragmentation feature of ZTools 4.0 must be used to free the memory that was taken by that object before the space can be used again.

The ^ID command also frees up the uncompressed version of the object in DRAM.

If the name is specified as *.ZOB, all downloaded bar code fonts (or other objects) will be deleted.

If the named downloadable object cannot be found in the R:, B:, or E: device, the ^ID command is ignored.

^IL

Image Load

Description: The ^IL command is used at the beginning of a label format to load a stored image of a format and merge it with additional data. The image is always positioned at ^FO0,0.

Using this technique to overlay the image of constant information with the variable data greatly increases the throughput of the label format.

Format:^ILd:o.x

Parameters:

d = device location of stored object
Accepted Values: E:, B:, R:
Default Value: R:

o = object name
Accepted Values: any 1 to 8 character name
Default Value: If no name is entered, UNKNOWN is used.

x = extension
Fixed: .GRF

Example:

The following example recalls the stored image SAMPLE2.GRF from DRAM and overlays it with the additional data. The graphic was stored using the ^IS command. Refer to the ^IS command for the stored label format.

```
^XA
^ILR:SAMPLE2.GRF^FS
^CFD,36,20
^FO15,210^FD900123^FS
^FO218,210^FDLINE 12^FS
^FO15,360^AD^FDZEBRA THERMAL^FS
^FO15,400^AD^FDTRANSFER PRINTER^FS
^FO15,540^FD54321^FS
^FO220,530^FDZ58643^FS
^FO15,670^A0,27,18^FDTesting Stored Graphic^FS
^FO15,700^A0,27,18^FDLabel Formats!!
^XZ
```

^IM

Image Move

Description: The ^IM command performs a direct move of an image from storage area into the bitmap. The command is identical to the Recall Graphic command except there are no sizing parameters.

Format: ^IMd:o.x

Parameters:

d = device location of stored object
Accepted Values: E:, B:, R:
Default Value: Search priority

o = object name
Accepted Values: any 1 to 8 character name
Default Value: if no name is entered, UNKNOWN is used

x = extension
Fixed: .GRF

Example: The following example moves the image SAMPLE.GRF from DRAM and prints it in 5 locations in its original size.

```
^XA
^FO100,100^IMR:SAMPLE.GRF^FS
^FO100,200^IMR:SAMPLE.GRF^FS
^FO100,300 ^IMR:SAMPLE.GRF^FS
^FO100,400^IMR:SAMPLE.GRF^FS
^FO100,500^IMR:SAMPLE.GRF ^FS
^XZ
```

Comments: By using the ^FO command, the graphic image can be positioned anywhere on the label.

The difference between ^IM and ^XG: ^IM does not have magnification, and therefore may require less formatting time. However, to take advantage of this, the image must be at a 8, 16, or 32 “bit boundary.”

^IS

Image Save

Description: The ^IS command is used within a ZPL II label format to save that format as a graphic image. This command is used within a label format, typically at the end. It instructs the printer to save that label format as a graphic image rather than a ZPL II script file. The image can later be recalled with virtually no formatting time and overlaid with variable data to form a complete label.

Using this technique to overlay the image of constant information with the variable data greatly increases the throughput of the label format. If the object name is omitted, the default name "UNKNOWN.GRF" is used.

The following is an example of a label format that might be saved as a graphic image (constant information). An example of how to use this saved image can be seen with the ^IL command.

Format: ^ISd:o.x,p

Parameters:

d = device location of stored object
Accepted Values: E:, B:, R:
Default Value: R

o = object name
Accepted Values: any 1 to 8 character name
Default Value: if no name is entered, UNKNOWN is used

x = extension
Accepted Values: .GRF or .PNG
Default Value: .GRF

p = print image after storing
Accepted Values: Y (yes) or N (no)
Default Value: Y

Example:

The following is an example of using the ^IS command to save a label format to DRAM. The name used to store the graphic is SAMPLE2.GRF.

```
^XA
^LH10,15^FWN^BY3,3,85^CFD,36
^GB430,750,4^FS
^FO10,170^GB200,144,2^FS
^FO10,318^GB410,174,2^FS
^FO212,170^GB206,144,2^FS
^FO10,498^GB200,120,2^FSR^FO212,498^GB209,120,2^FS
^FO4,150^GB422,10,10^FS
^FO135,20^A0,70,60^FDZEBRA^FS
^FO80,100^A0,40,30^FDTECHNOLOGIES CORP^FS
^CFD,18,10^FS^FO15,180^FDARTICLE#^FS
^FO218,180^FDLOCATION^FS^FO15,328^FDDESCRIPTION^FS
^FO15,508^FDREQ.NO.^FS
^FO220,508^FDWORK NUMBER^FS
^FO15,630^AD,36,20^FDCOMMENTS:^FS
^ISR:SAMPLE2.GRF,Y
^XZ
```

~JA

Cancel All

Description: The ~JA command cancels all format commands in the buffer. It also cancels any batches that may be printing.

The printer will stop printing after the current label (if one is printing) is finished printing. All internal buffers will be cleared of data. The "DATA" LED will turn off.

~JA scans the buffer for the ~JA and only deletes the data before the ~JA in the input buffer – it doesn't scan the remainder of the buffer for additional ~JA commands.

Format: ~JA

^JB

Initialize Flash Memory

Description: The ^JB command is used to initialize the two types of Flash memory available in the Zebra printers.

Format: ^JBa

Parameters:

a = device to initialize
B = Flash card (PCMCIA)
E = Flash memory

Example:

^JBB – initializes the optional Flash card when installed in the printer.

^JBE – initializes the optional Flash memory when installed in the printer.

~JB

Reset Optional Memory

Description: The ~JB command is used for the following conditions:

- This command must be sent to the printer if the battery supplying power to the battery powered memory card fails and is replaced. A bad battery would show a "battery dead" condition on the Printer Configuration Label.
- To intentionally clear (reinitialize) the memory card (the card must not be write protected).

Format: ~JB

Comments: If the battery is replaced and this command is not sent to the printer, the memory card will not function.

^JC

Set Media Sensor Calibration

Description: The ~JC command is used to force a label length measurement and recalibrate the media and ribbon sensors.

Format: ^JC

Comments: In continuous mode, only the media and ribbon sensors will be calibrated.

~JD

Enable Communications Diagnostics

Description: The ~JD command initiates a diagnostic mode that produces an ASCII printout (using current label length and full width of printer) of all characters received by the printer. This printout includes the ASCII Characters, the hexadecimal value and any communication errors.

Format: ~JD

~JE

Disable Diagnostics

Description: The ~JE command cancels the diagnostic mode and returns the printer to normal label printing.

Format: ~JE

~JF

Set Battery Condition

Description: There are two low battery voltage levels sensed by the PA/PT400™ printers. When battery voltage goes below the first level, the green LED begins flashing as a warning but printing will continue. When this warning occurs, it is good practice to recharge the battery.

As printing continues, a second low voltage level will be reached. At this point, both green and orange LEDs will flash as a warning, and printing will pause automatically.

When "Pause on Low Voltage" is selected (Y), and the battery voltage level falls below the second "low voltage" level, printing pauses and an error condition is displayed as an indication that the printer should be plugged into the battery charger. By pressing the FEED key, printing will continue on a label-by-label basis, but there is a high risk of losing label format information due to the continued decrease of battery voltage.

When "Pause on Low Voltage" is deselected (N), and the battery voltage level falls below the second "low voltage" level, printing will continue and the orange LED will remain *off*. If the battery voltage continues to decrease, label information could be lost and the printer could stop operation. This option should be selected only when the printer is connected to the Car Battery Adapter. The printer may from time to time sense that battery voltage is below the first low voltage level. But, due to the continuous recharging of the car battery, the further loss of battery voltage is not a concern and printing will continue.

If this option is not selected when using the Car Battery Adapter, the user may need to press the FEED key to un-pause the printer and print each label.

Format: ~JFp

Parameters:

p = pause on low voltage
Accepted Values: Y (pause on low voltage) or N (do not pause). N is suggested when the printer is powered by the car battery adapter.
Default Value: Y

~JG

Graphing Sensor Calibration

Description: The ~JG command is used to force a label length measurement, recalibrate the media and ribbon sensors and print a graph (media sensor profile) of the sensor values.

Format: ~JG

^JJ

Set Auxiliary Port

Description: The ^JJ command allows you to control an on-line verifier or applicator device.

Format: ^JJa,b,c,d,e,f

Parameters:

a = operational mode for auxiliary port
Accepted Values:
0 = off
1 = reprint on error – The printer stops on a label with a verification error. When the pause key is pressed this label is reprinted (if ^JZ is set to reprint). If a bar code is near the upper edge of a label, the label will feed out far enough for the bar code to be verified and then backfeed to allow the next label to be printed and verified.
2 = maximum throughput – The printer stops when a verification error is detected. The printer starts printing the next label while the verifier is still checking the previous label. This mode provides maximum throughput, but does not allow the printer to immediately stop on a label with a verification error.
Default Value: 0

b = application mode
Accepted Values:
0 = off
1 = End Print signal normally high, and low only when the printer is moving the label forward.
2 = End Print signal normally low, and high only when the printer is moving the label forward.
3 = End Print signal normally high, and low for 20ms when a label has been printed and positioned.
4 = End Print signal normally low, and high for 20ms when a label has been printed and positioned.
Default Value: 0

c = application mode start signal print

Accepted Values:

p = pulse mode – Start Print signal must be de-asserted before it can be asserted for the next label.

l = level mode – Start Print signal does not need to be de-asserted to print the next label. As long as the Start Print signal is low and a label is formatted, the printer will print a label.

Default Value: 0

d = application label error mode

Accepted Values:

e = error mode – the printer will assert the "Service Required" signal (svce_req - pin 10) on the application port, enter into pause mode, and display an error message on the LCD display.

f = feed mode – the printer will print a blank label when the web is not found where expected to synch the printer to the media.

Default Value: f

e = reprint mode

Accepted Values:

e = enabled – printer will ignore the reprint signal.

d = disabled – printer will reprint the last label printed after the signal is asserted. If a label is canceled, the label to be reprinted will also be canceled. This mode consumes more memory because the last printed label is not released until reprint.

Default Value: d

f = ribbon low mode

Accepted Values:

e = enabled – printer warning issued when ribbon low.

d = disabled – printer warning not issued when ribbon low.

Default Value: e

~JL

Set Label Length

Description: The ~JL command is used to set the label length. Depending on size of label, the printer will feed one or more blank labels.

Format: ~JL

^JM

Set Dots per Millimeter

Description: Use the ^JM (Set Dots/Millimeter) command to double the format size of the label . Depending on the print head, normal dots per millimeter on a Zebra Printer are 12-dots/mm (304-dots/inch), 8-dots/mm (203-dots/inch) or 6-dots/mm (153-dots/inch).

This command lowers the density of the print – 24 dots/mm would become 12, 12 dots/mm would become 6 dots/mm, 8 dots/mm would become 4, and 6 would become 3.

This command must be entered before the first ^FS command. The effects of ^JM are persistent.

Format: ^JMn

Parameters:

n = set dots per millimeter
Accepted Values:
A = 24 dots/mm, 12 dots/mm, 8 dots/mm or 6 dots/mm
B = 12 dots/mm, 6 dots/mm, 4 dots/mm or 3 dots/mm
Default Value: A

Example:

Comments: If ^JMB is used, the UPS Maxicode bar code becomes out of specification.

~JN

Head Test Fatal

Description: The ~JN command resets the printhead element error override, acting as a toggle for ~JO. If the Head Test Fatal option is activated, it will cause the printer to halt when a head test failure is encountered.

Format: ~JN

~JO

Head Test Non-fatal

Description: The ~JO command is the default printhead test condition and overrides a failure of printhead element status check. This state is changed when the printer receives a ~JN (Head Test Fatal) command. The printhead test will not produce an error if the ~JO default is active.

Format: ~JO

~JP

Pause and Cancel Format

Description: The ~JP command clears the format currently being processed and places the printer in the Pause mode.

The command clears the next format that would print, or the oldest format from the buffer. Each subsequent ~JP command clears the next buffered format until the buffer is empty. The DATA indicator turns off when the buffer is empty and no data is being transmitted.

Issuing the ~JP command is identical to using the CANCEL switch on the printer, only printer does not have to be in the Pause mode first.

Format: ~JP

~JR

Power On Reset

Description: The ~JR command resets all of the printer's internal software, performs a power-on self-test (POST), clears the buffer and DRAM, and resets communication parameters and default values. ~JR performs the same function as a manual power-on reset.

Format: ~JR

~JS

Change Backfeed Sequence

Description: The ~JS command is used to control the backfeed sequence. This command can be used on printers with or without built-in cutters.

The primary applications are:

1. to allow programming of the "rest point" of the cut edge of continuous media.
2. provide immediate backfeed after peel-off when the printer is used in a print/apply application configuration.

This command only stays in effect until the printer is powered *off*, a new ~JS command is sent, or the setting is changed on the front panel. When a ~JS command is encountered, it will supersede the current front panel setting for the Backfeed Sequence.

The most common way of eliminating backfeed is to operate in rewind mode. Rewind mode does not backfeed at all. After a label is printed, the leading edge of the next label is placed at the print line. This eliminates the need to backfeed and does not introduce a non-printable area at the leading edge/bottom of the label. It also does not allow the label to be taken from the printer since it is not fed out from under the printhead.

Running in another mode with backfeed turned off allows the label to be taken and eliminates the time overhead of the backfeed sequence. It does introduce a 1-inch, non-printable area at the leading edge/bottom of the label on 170PAX printers in applicator mode.

Format: ~JSb

Parameters:

b = backfeed order in relation to printing
Accepted Values:
A = 100 percent backfeed after printing and cutting
B = 0 percent backfeed after printing and cutting, and 100 percent before printing the next label
N = normal – 90 percent backfeed after label is printed
O = off – turn backfeed off completely
Default Value: N

When using a specific value, the difference between value entered and 100 percent is done before the next label is printed. For example, a value of 40 means 40 percent of the backfeed takes place after the label is cut or removed. The remaining 60 percent takes place before the next label is printed.

The value for this command is also reflected in the “Backfeed” parameter on the printer configuration label.

For ~JSN – the “Backfeed” parameter is listed as “Default”

For ~JSA – or 100 the “Backfeed” parameter is listed as “After”

For ~JSB – or 0 the “Backfeed” parameter is listed as “Before”

For ~JS10 – to 90 the “Backfeed” parameter is listed as the value

^JT

Head Test Interval

Description: The ^JT command lets you change the printhead test interval from 100 to any desired interval. The ^JT command allows the printer to run the test after printing a label. When a parameter is defined, the printer will run the test after printing a set amount of labels.

The printer's default head test state is off. Parameters for running the printhead test are defined by the user.

Format: ^JT#,a,b,c

Parameters:

= **four-digit number of labels to be printed between head tests**
Accepted Values: 0000 to 9999. If a value greater than 9999 is entered, it will be ignored.
Default Value: 0000 (off)

a = **manually select range of elements to test**
Accepted Values: Y (yes) or N (no)
Initial Value at Power-up: N

b = **first element to check when parameter**
Accepted Values: 0 to 9999
*Initial Value at Power-up:*0

c = **last element to check when parameter**
Accepted Values: 0 to 9999
*Initial Value at Power-up:*9999

Comments: The ^JT command supports testing a range of print elements. The printer automatically selects the test range by tracking which elements have been used since the previous test.

^JT will also turn the automatic mode to specify the first and last elements for the head test. This makes it possible to select any specific area of the label or the entire print width.

If the last element selected is greater than the print width selected, the test stops at the selected print width.

Whenever the head test command is received, a head test is performed on the next label unless the count is set to zero.

^JU

Configuration Update

Description: The ^JU command sets the active configuration for the printer.

Format: ^JUa

Parameters:

a = active configuration
Accepted Values:
F = reload factory values. These values will be lost at power-off if not saved with ^JUS.
R = recall last saved values
S = save current settings. These will be used at power-on.

^JW

Set Ribbon Tension

Description: ^JW sets the ribbon tension for the printer it is sent to.

Format: ^JWt

Parameters:

t = tension
Accepted Values:
L = low
M = medium
H = high

Comments: ^JW is used only for PAX-Series printers.

~JX

Cancel Current Partially Input Format

Description: The ~JX command cancels a format that is currently being sent to the printer. It does not affect any formats currently being printed, or any subsequent formats that may be sent.

Format: ~JX

^JZ

Reprint After Error

Description: The ^JZ command is used to reprint a partially printed label caused by a Ribbon Out, Media Out or Head Open error condition. The label will be reprinted as soon as the error condition is corrected.

This command will remain active until another ^JZ command is sent to the printer or the printer is turned off.

Format: ^JZa

Parameters:

a = reprint after error
Accepted Values: Y (yes) or N (no)
Initial Value at Power-up: Y

Comments: ^JZ sets the error mode for the printer. If ^JZ changes, only labels printed after the change will be effected.

If the parameter is missing or incorrect, the command will be ignored.

~KB

Kill Battery (Battery Discharge Mode)

Description: In order to maintain performance of the rechargeable battery of the portable printers, the battery must be fully discharged and recharged regularly. The ~KB command places the printer in battery discharge mode to allow for draining the battery without actually printing.

Format: ~KB

Comments: While the printer is in discharge mode, the green power LED will flash in groups of three flashes.

The discharge mode may be terminated by sending a printing format to the printer or by pressing either of the front panel buttons.

If the battery charger is plugged into the printer, the battery will be recharged automatically once the discharge process is completed.

The ~KB command is only supported by the PA-Series and PT-Series printers.

^KD

Date/Time Format (for Real Time Clock)

Description: The ^KD command is used to select the format in which the Real Time Clock's date and time information is printed on a configuration label, displayed on the "Printer Idle" LCD front panel display, and displayed while setting the date and time.

Format: ^KDa

Parameters:

a = value of time/date format
Accepted Values:
0 = normal version number string
1 = MM/DD/YY (24-hour clock)
2 = MM/DD/YY (12-hour clock)
3 = DD/MM/YY (24-hour clock)
4 = DD/MM/YY (12-hour clock)
Default Value: 0

Comments: If the Real Time Clock hardware is not present, the display mode will be set to "Version Number."

If the display mode is set to "Version Number" and the Real Time Clock hardware is present, the date/time format shown on the configuration label and on the LCD front panel display when setting the data/time will be set to value 1.

^KL

Define Language

Description: The ^KL command is used to select the language used for the front panel display.

Format: ^KLa

Parameters:

a = language
Accepted Values:
1 = English
2 = Spanish
3 = French
4 = German
5 = Italian
6 = Norwegian
7 = Portuguese
8 = Swedish
9 = Danish
10 = Spanish2
11 = Dutch
12 = Finnish
13 = Custom (not currently supported)
Default Value: 1

^KN

Define Printer Name

Description: The printer's network name and description can be set using the ^KN command. ^KN is designed to make your Zebra printer easy for users to identify. The name the administrator designates will be listed on the configuration label and on the Web page generated by the printer.

Format: ^KNa,b

Parameters:

a = printer name
Accepted Values: up to 16 characters

b = printer description
Accepted Values: up to 35 characters

Example:

```
^KNZebra1,desk_printer
```

^KP

Define Password

Description: The ^KP command is used to define the password that must be entered to access the front panel switches and LCD set up mode.

Format: ^KP####

Parameters:

####	=	**mandatory four-digit password** *Accepted Values:* any four digit numeric sequence *Default Value:* 1234

Comments: If the password is forgotten, the printer can be returned to a default setup mode in which the default password of 1234 will be entered. Caution should be used, however – this will also set the printer configuration values back to the default.

^LH

Label Home

Description: The ^LH command sets the label home position.

The default home position of a label is the upper-left corner (position 0,0 along the x-axis and y-axis). This is the axis reference point for labels. Any area below and to the right of this point is available for printing. The ^LH command changes this reference point. For instance, when working with preprinted labels, use this command to move the reference point below the preprinted area.

This command will only affect fields that come after it. It is suggested that this be one of the first commands in the label format.

Format: ^LHx,y

Parameters:

x = x-axis position (in dots)
Accepted Values: 0 to 32000
Initial Value at Power-up: 0 or last permanent saved value

y = y-axis position (in dots)
Accepted Values: 0 to 32000
Initial Value at Power-up: 0 or last permanent saved value

Depending on the printhead used in your printer, use one of the following when figuring the values for x and y:

6 dots = 1 mm (millimeter), 152 dots = 1 inch.
8 dots = 1 mm (millimeter), 203 dots = 1 inch.
11.8 dots = 1 mm (millimeter), 300 dots = 1 inch.
12 dots = 1 mm (millimeter), 304 dots = 1 inch.

To be compatible with existing printers, this command must come before the first ^FS (Field Separator) command. Once you have issued an ^LH command, the setting is retained until you turn off the printer or send a new ^LH command to the printer.

^LL

Label Length

Description: The ^LL command defines the length of the label. This command is necessary when using continuous media (i.e. media not divided into separate labels by gaps, spaces, notches, slots or holes).

To affect the current label and be compatible with existing printers, this command must come before the first ^FS command. Once you have issued an ^LL command, the setting is retained until you turn off the printer or send a new ^LL command to the printer.

Format: ^LLy

Parameters:

y = y-axis position (in dots)
Accepted Values: 1 to 32000, not to exceed the maximum label size. While the printer will accept any value for this parameter, the amount of memory installed will determine the maximum length of the label.

Default Values:
Stripe® printers: 1225
Xi™ printers: 1244
A value must be entered or the command is ignored
8 inches using 6 dot/mm printhead
6 inches using 8 dot/mm printhead
3 inches using 12 dot/mm printhead

Comments: The following formulas can be used to determine the value of *y*:

For 6 dot/mm printheads...
Label length in inches x 152.4 (dots/inch) = y

For 8 dot/mm printheads....
Label length in inches x 203.2 (dots/inch) = y

For 12 dot/mm printheads...
Label length in inches x 304.8 (dots/inch) = y

For 24 dot/mm printheads...
Label length in inches x 609.6 (dots/inch) = y

Values for *y* depend on the memory size. If the entered value for *y* exceeds the acceptable limits, the bottom of label will be cut off. The label will also shift down from top to bottom.

If multiple ^LL commands are issued in the same label format, the last ^LL command will also affect the next label unless it is prior to the first ^FS.

^LR

Label Reverse Print

Description: The ^LR command reverses the printing of all fields in the label format. It allows a field to appear as white over black or black over white.

Using the ^LR is identical to placing a ^FR in all current and subsequent fields.

Format: ^LRa

Parameters:

a = reverse print all fields
Accepted Values: Y (yes) or N (no)
Initial Value at Power-up: N or last permanently saved value

Example:

```
^XA^LRY
^FO100,60
^GB195,203,195^FS
^FO100,110
^CFG^FDLABEL^FS
^FO130,170
^FDREVERSE^FS
^XZ
```

Comments: The ^LR setting will remain active unless turned off by ^LRN command or the printer is powered down.

The effects of an ^LR command will not be seen unless fields overlap as shown in the above example.

Only fields that come after this command will be affected.

^LS

Label Shift

Description: The ^LS command allows for compatibility with Z-130 printer formats that are set for less than full label width. It is used to shift all field positions to the left so that the same commands used on a Z-130 or Z-220 Printer can be used on other Zebra printers.

To determine the value for the ^LS command use the following formula.

Z-130 and Z-220 values for ^LHx + ^FOx
(distance from edge of label) = printer value for ^LSa.

If the print position is less than 0, set ^LS to 0.

To be compatible with existing Zebra printers, this command must come before the first ^FS command. Once you have issued an ^LS command, the setting is retained until you turn off the printer or send a new ^LS command to the printer.

Format: ^LSa

Parameters:

a = shift left value (in dots)
Accepted Values: -9999 to 9999
Initial Value at Power-up: 0

Comments: When entering positive values, it is not necessary to use the + sign. The value is assumed to be positive unless preceded by a negative sign.

^LT

Label Top

Description: The ^LT command moves the entire label format a maximum of 120 dot rows up or down from its current position with respect to the top edge of the label. A negative value moves the format towards the top of the label; a positive number moves the format away from the top of the label.

This command can be used to fine-tune the position of the finished label without having to change any of the existing parameters.

Format: ^LTx

Parameters:

x = label top (in dot rows)
Accepted Values: -120 to 120
Default Value: a value must be specified or the command is ignored.

Comments: The *Accepted Value* range for *x* may be smaller depending on the printer platform.

The ^LT command does not change the media rest position.

^MC

Map Clear

Description: In normal operation, the bitmap is cleared after the format has been printed. The ^MC command is used to retain the current bitmap. This applies to current and subsequent labels until cleared with a second ^MCY command.

Format: ^MCa

Parameters:

a = map clear
Accepted Values: Y (clear bitmap) or N (do not clear bitmap)
Initial Value at Power-up: N

Comments: The ^MC command retains the image of the current label after formatting. It will appear in the background of the next label printed.

^MD

Media Darkness

Description: This ^MD command adjusts the darkness relative to the current darkness setting. The minimum value is -30 and the maximum value is 30.

Format: ^MDa

Parameters:

a = media darkness level
Accepted Values: -30 to 30, depending on current value.
Initial Value at Power-up: 0
If no value is entered, this command is ignored.

Examples:

- If the current value (value on configuration label) is 16, entering the command ^MD-9 would decrease the value to 7.
- If the current value (value on configuration label) is 1, entering the command ^MD15 would increase the value to 16.
- If the current value (value on configuration label) is 25, entering the command ^MD10 would only increase the value to 30 since that is the maximum value allowed.

Each ^MD command is treated separately in relation to the current value as printed on the configuration label.

For example, this is what would happen if two ^MD commands were received.

Assume the current value is 15. An ^MD-6 command is received that changes the current value to 9. Another command, ^MD2, is received. The current value is changed 17. The two ^MD commands were treated individually with respect to the current value of 15.

^MF

Media Feed

Description: The ^MF command dictates what happens to the media at power-up and at head-close after the error is cleared.

Format: ^MFp,h

Parameters:

p = feed action at power-up
Accepted Values:
F = feed to the first web after sensor
C = (see ~JC definition)
L = (see ~JL definition)
N = no media feed
Default Value: platform-dependent

h = feed action after closing printhead
Accepted Values:
F = feed to the first web after sensor
C = (see ~JC definition)
L = (see ~JL definition)
N = no media feed
Default Value: platform-dependent

Comments: It is important to remember that if you choose the *N* setting, the printer assumes that the media and its position relative to the printhead is exactly the same as it was before power was turned off or the printhead was opened. Use the ^JU command to save changes.

^ML

Maximum Label Length

Description: The ^ML command lets you adjust the maximum label length.

Format: ^MLa

Parameters:

a = maximum label length (in dot rows)
Accepted Values: 0 to maximum length of label
Default Value: last permanently saved value

Comments: In order for calibration to work properly, you must set the maximum label length equal to or greater than your actual label length.

^MM

Print Mode

Description: The ^MM command determines the action the printer takes after a label or group of labels has been printed. There are four different modes of operation:

1. Tear-Off – After printing, the label is advanced so that the web is over the tear bar. Label, with backing attached, can then be torn off manually.
2. Rewind – The label and backing are rewound on an (optional) external rewind device. The next label is positioned under the printhead (no backfeed motion).
3. Peel-Off – After printing, the label is moved forward and activates a Label Available Sensor. Printing stops until the label is manually removed from the printer.

   Power peel – backing material is automatically rewound using an optional internal rewind spindle.

   Value peel – Backing is fed down the front of the printer and manually removed.

   Pre-peel – After each label is manually removed, this causes the printer to feed the next label forward to pre-peel a small portion of the label material away from the backing material prior to backfeeding and printing the label. The pre-peel feature assists in the proper peel operation of some media types.
4. Cutter – After printing, the media feeds forward and is automatically cut into predetermined lengths.

Format: ^MMa,b

Parameters:

a = desired mode
Accepted Values:
T = tear off
P = peel off (not available on S-300)
R = rewind
A = applicator
C = cutter
Default Value: T

b = pre-peel select
Accepted Values: Y (yes) or N (no)
Default Value: Y

The command will be ignored if parameters are missing or invalid. The current value of the command will remain unchanged.

Comments: Make sure that you select the appropriate command for the print mode you are using to avoid unexpected results.

^MN

Media Tracking

Description: The ^MN command relays to the printer what type of media is being used (continuous or non-continuous) for purposes of tracking. There are two choices for this command:

1. **Continuous Media** – This media has no physical characteristic (web, notch, perforation, mark, etc.) to separate labels. Label Length is determined by the ^LL command.
2. **Non-continuous Media** – This media has some type of physical characteristic (web, notch, perforation, mark, etc.) to separate the labels.

Format: ^MNa

Parameters:

a = media being used
Accepted Values:
N = continuous media
Y = non-continuous media
W = non-continuous media web sensing
M = non-continuous media mark sensing

Comments: If the parameter is missing or invalid, the command will be ignored.

^MP

Mode Protection

Description: The ^MP command is used to disable the various Mode functions on the front panel. Once disabled, the settings for the particular mode function can no longer be changed and the LED associated with the function will not light.

Since this command has only one parameter, each mode will have to be disabled with an individual ^MP command.

Format: ^MPa

Parameters:

a = mode to protect
Accepted Values:
D = Disable Darkness Mode
P = Disable Position Mode
C = Disable Calibration Mode
E = Enable All Modes
S = Disable all Mode Saves. (Modes can be adjusted but values will not be saved.)
W = Disable Pause Key
F = Disable Feed Key
X = Disable Cancel Key
M = Disable Menu Changes
Default Value: E

Example:

```
^XA^MPD^MPC^XZ
```

Comments: If the parameter is missing or invalid, the command will be ignored.

^MT

Media Type

Description: The ^MT command selects the type of media being used in the printer. There are two choices for this command:

1. **Thermal Transfer Media** – This media uses a high carbon black or colored ribbon. The ink on the ribbon is bonded to the media.
2. **Direct Thermal Media** – The media is heat sensitive and requires no ribbon.

Format: ^MTa

Parameters:

a = media type used
Accepted Values:
T = thermal transfer media
D = direct thermal media

Comments: If the parameter is missing or invalid, the command will be ignored.

^MU

Set Units of Measurement

Description: This command sets the printer units of measurement. The ^MU command works on a field-by-field basis. Once the mode units is set, it carries over from field to field until a new mode units is entered.

^MU also allows for printing at lower resolutions – 600 dpi printers are capable of printing at 300, 200, and 150 dpi; 300 dpi printers are capable of printing at 150 dpi.

Format: ^MUa,b,c

Parameters:

a = units
Accepted Values:
D = dots
I = inches
M = millimeters
Default Value: D

b = format base in dots per inch
Accepted Values: 150, 200, 300
Default Value: a value must be entered or the command is ignored.

c = desired dots per inch conversion
Accepted Values: 300, 600
Default Value: a value must be entered or the command is ignored.

Example 1: Setting Units

Assume 8 dot-per-millimeter (203 dot-per-inch) printer.

Field based on dots:

```
^MUd^FO100,100^GB1024,128,128^FS
```

Field based on millimeters:

```
^MUm^FO12.5,12.5^GB128,16,16^FS
```

Field based on inches:

```
^MUi^FO.493,.493^GB5.044,.631,.631^FS
```

Example 2: Converting DPI Values:

Convert a 150 dpi format to a 300 dpi format with a base in dots:

```
^MUd,150,300
```

Convert a 150 dpi format to a 600 dpi format with a base in dots:

```
^MUd,150,600
```

Convert a 200 dpi format to a 600 dpi format with a base in dots:

```
^MUd,200,600
```

To reset the conversion factor to the original format, enter matching values for parameters b and c:

```
^MUd,150,150
^MUd,200,200
^MUd,300,300
^MUd,600,600
```

Comments: This command should appear at the beginning of the label format to be in proper ZPL II format.

To turn the conversion off, enter matching values for parameter *b* and *c*.

~NC

Network Connect

Description: The ~NC command is used to connect a particular printer into the network by calling up the printer's Network ID Number.

Format:~NC#

Parameters:

#	=	**network ID number assigned** *Accepted Values:* 001 to 999 *Default Values:* 000 (none)

Comments: Use this command at the beginning of any label format to specify which printer on the network is to be used. Once the printer is established, it will continue to be used until it is changed by another ~NC command. This command must be included in the label format to "wake up the printer." This number must be three digits in length.

The commands ~NC, ^NI, ~NR, and ~NT are only used with ZNET RS-485 printer networking.

^NI

Network ID Number

Description: The ^NI command is used to assign a Network ID number to the printer. This must be done before the printer can be used in a network.

Format: ^NI#

Parameters:

= **network ID number assigned**
Accepted Values: 001 to 999
Default Values: 000 (none)

Comments: The last Network ID Number set will be the one recognized by the system. This value must be three digits in length or it will not be recognized.

The commands ~NC, ^NI, ~NR, and ~NT are only used with ZNET RS-485 printer networking.

~NR

Set All Network Printers Transparent

Description: The ~NR command sets all printers in the network transparent, regardless of ID or current mode.

Format:~NR

Comments: The commands ~NC, ^NI, ~NR, and ~NT are only used with ZNET RS-485 printer networking.

~NT

Set Currently Connected Printer Transparent

Description: The ~NT command sets the currently connected network printer transparent.

Format: ~NT

Comments: With Z Series™ printers, the ~NT command functions the same as the ~NR command. All Z-Series printers on a network will receive the transmission.

The commands ~NC, ^NI, ~NR, and ~NT are only used with ZNET RS-485 printer networking.

^PF

Slew Given Number of Dot Rows

Description: The ^PF command causes the printer to slew labels (move labels at a high speed without printing) a specified number of dot rows from the bottom of the label. This allows faster printing when the bottom portion of a label is blank.

Format:^PF#

Parameters:

= **number of dots rows to slew**
Accepted Values: 0 to 32000
Default Value: None. If the value is incorrect or missing, the command will be ignored.

^PH ~PH

Slew to Home Position

Description: The ~PH or ^PH (Slew to Home Position) command causes the printer to feed one blank label.

- The ~PH command feeds one label after the format currently being printing is done or when the printer is placed in pause.
- The ^PH command feeds one blank label after the format it is in prints.

Format: ^PH *or* ~PH

^PM

Printing Mirror Image of Label

Description: The ^PM command prints the entire printable area of the label as a mirror image. This command flips the image from left to right.

Format: ^PMa

Parameters:

a = print mirror image of entire label
Accepted Values: Y (yes) or N (no)
Default Value: N

Example:

```
^XA^PMY
^FO130,110
^CFG^FDMIRROR^FS
^FO130,170
^FDIMAGE^FS
^XZ
^XA^PMN^XZ
```

Comments: If the parameter is missing or invalid, the command will be ignored. Once entered, the ^PM command will remain active until ^PMN is received or the printer is powered down.

^PO

Print Orientation

Description: The ^PO command inverts the label format 180 degrees. In essence, the label is printed upside-down. If the original label contains commands such as ^LL, ^LS, ^LT and ^PF, the inverted label output will be effected differently.

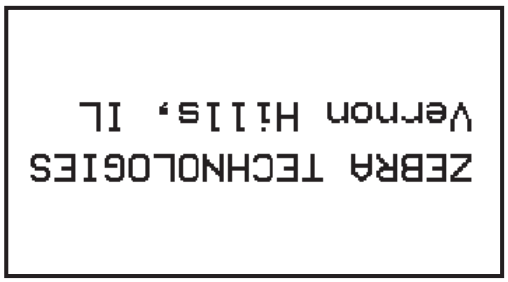
Format: ^POa

Parameters:

a = invert label 180 degrees
Accepted Values: N (normal) or I (invert)
Default Value: N

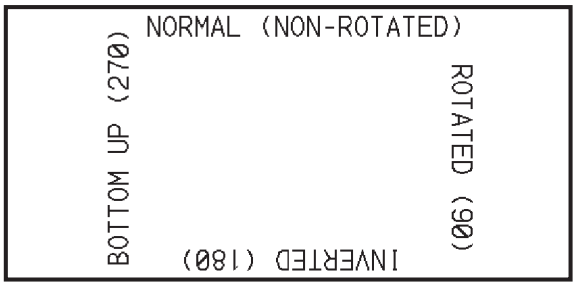
Example:

```
^XA^CFD
^POI
^LH330,10
^FD50,50^FDZEBRA TECHNOLOGIES^FS
^FD50,75^FDVernon Hills, IL
^XZ
```



The ^POI command moves the Label Home position to the furthest point away from the main frame. Therefore, a different ^LH (Label Home) can be used to move the print back onto the label.

Defining Field Orientation Parameters



Comments: If multiple ^PO commands are issued in the same label format, only the last command sent to the printer is used.

Once you issue a ^PO command, the setting is retained until another ^PO command is received or the printer is powered down.

^PP ~PP

Programmable Pause

Description: The ~PP command stops printing after the current label is printed (if one is printing) and places the printer in the Pause mode.

The ^PP command is not immediate. Therefore, several labels may be printed before a pause is performed. This command will pause the printer after the current format prints.

The operation is identical to pressing the PAUSE button on the front panel of the printer. The printer will remain paused until the PAUSE button is pressed or a ~PS command is sent to the printer.

Format: ^PP *or* ~PP

^PQ

Print Quantity

Description: The ^PQ command gives control over several printing operations. It controls the number of labels to print, the number of labels printed before printer pauses, and the number of replications of each serial number.

Format: ^PQq,p,r,o

Parameters:

q = total quantity of labels to print
Accepted Value: 1 to 99,999,999
Default Value: 1

p = pause and cut value
Accepted Value: 1 to 99,999,999 labels between pauses
Default Value: 0 – no pause

r = replicates of each serial number
Accepted Value: 0 to 99,999,999 replicates
Default Value: 0 – no replicates

o = override pause count
Accepted Value: Y (yes) or N (no)
Default Value: N

If the parameter is set to Y, the printer cuts but doesn't pause.

With the *o* parameter set to Y, the printer will NOT pause after every group count of labels has been printed. With the *o* parameter set to N (default), the printer will pause after every group count of labels has been printed.

Examples:

^PQ50,10,1,Y: Print a total quantity of 50 labels with one replicate of each serial number. Print the total quantity in groups of 10, but do not pause after every group.

^PQ50,10,1,N: Print a total quantity of 50 labels with one replicate of each serial number. Print the total quantity in groups of 10, pausing after every group.

^PR

Print Rate

Description: The ^PR command determines the media speed during printing and the slew speed (feeding a blank label).

The printer will operate with the selected speeds until the setting is reissued or the printer is turned off.

The print speed is application-specific. Since print quality is affected by media and ribbon, printing speeds and printer operating modes, *it is very important to run tests for your applications.*

Format: ^PRp,s,b

Parameters:

p = print speed

Accepted Values:

A or 2	50.8 mm/sec.	(2 inches/sec.)
B or 3	76.2 mm/sec.	(3 inches/sec.)
C or 4	101.6 mm/sec.	(4 inches/sec.)
5	127 mm/sec.	(5 inches/sec.)
D or 6	152.4 mm/sec.	(6 inches/sec.)
E or 8	203.2 mm/sec.	(8 inches/sec.)
9	220.5 mm/sec.	(9 inches/sec.)
10	245 mm/sec.	(10 inches/sec.)
11	269.5 mm/sec.	(11 inches/sec.)
12	304.8 mm/sec.	(12 inches/sec.)

Default Value: A

s = slew speed

Accepted Values:

A or 2	50.8 mm/sec.	(2 inches/sec.)
B or 3	76.2 mm/sec.	(3 inches/sec.)
C or 4	101.6 mm/sec.	(4 inches/sec.)
5	127 mm/sec.	(5 inches/sec.)
D or 6	152.4 mm/sec.	(6 inches/sec.)
E or 8	203.2 mm/sec.	(8 inches/sec.)
9	220.5 mm/sec.	(9 inches/sec.)
10	245 mm/sec.	(10 inches/sec.)
11	269.5 mm/sec.	(11 inches/sec.)
12	304.8 mm/sec.	(12 inches/sec.)

Default Value: D

b = backfeed speed

Accepted Values:

A or 2	50.8 mm/sec.	(2 inches/sec.)
B or 3	76.2 mm/sec.	(3 inches/sec.)
C or 4	101.6 mm/sec.	(4 inches/sec.)
5	127 mm/sec.	(5 inches/sec.)
D or 6	152.4 mm/sec.	(6 inches/sec.)
E or 8	203.2 mm/sec.	(8 inches/sec.)
9	220.5 mm/sec.	(9 inches/sec.)
10	245 mm/sec.	(10 inches/sec.)
11	269.5 mm/sec.	(11 inches/sec.)
12	304.8 mm/sec.	(12 inches/sec.)

Default Value: A

Comments: The speed setting for *p*, *s*, and *b* is dependent on the limitations of the printer. If a particular printer is limited to 6 inches per second, a value of 12 can be entered, but it will only perform at a 6 ips rate. Refer to your printer's user's guide for specifics on performance.

~PR

Applicator Reprint

Description: The ~PR command is only supported by the PAX and PAX2-Series printers. If the ~PR command is enabled (refer to ^JJ), the last label printed will be reprinted, similar to the applicator asserting the *Reprint* signal on the applicator port.

Format: ~PR

Comments: The ~PR command is only available on the PAX and PAX2-Series printers. Pressing the PREVIOUS button on the front panel will also cause the last label to be reprinted.

~PS

Print Start

Description: The ~PS command causes a printer in the Pause mode to resume printing. The operation is identical to pressing the PAUSE button on the front panel of the printer when the printer is already in the Pause mode.

Format: ~PS

^PW

Print Width

Description: The ^PW command allows you set the print width.

Format: ^PWa

Parameters:

a = label width in dots

Comments: The ^PW command is not available to all Zebra printers, specifically the Zebra 160S, 105S, 105Se and the S300 and S500 printers.

~RO

Reset Advanced Counter

Description: The ~RO command resets the advanced counters used by the printer to monitor label generation in inches, centimeters, and number of labels. Two resettable counters are available and can be reset.

Format: ~ROc

Parameters:

c = counter number
Accepted Values: 1 or 2
Default Value: A value must be specified or the command is ignored.

^SC

Set Communications

Description: The ^SC command allows you to change the communications parameters you are using.

Format: ^SCa,b,c,d,e,f

Parameters:

a = baud rate
Accepted Values: 110, 130, 600, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, or 57600.
Default Value: must be specified

b = word length (in data bits)
Accepted Values: 7 or 8
Default Value: must be specified

c = parity
Accepted Values: N (none), E (even), or O (odd)
Default Value: must be specified

d = stop bits
Accepted Values: 1 or 2
Default Value: must be specified

e = handshake
Accepted Values: X (XON/XOFF) or D (DTR/DSR)
Default Value: must be specified

f = Zebra protocol
Accepted Values:
A = Ack/Nak
N = none
Z = Zebra
Default Value: must be specified

Comments: If you do not specify a new setting for a parameter, it remains unchanged. It does not change to the default value.

If any of the parameters are missing, that parameter is ignored. If the parameter is out of specification, not supported by a particular printer, or has a ZPL-override DIP switch set, the command will be ignored.

A ^JUS command will cause the communications mode changes to persist through power-up and software resets.

~SD

Set Darkness

Description: The ~SD command lets you set the darkness of printing via ZPL. It is equivalent to the darkness setting parameter on the front panel display

Format: ~SD#

Parameters:

#	=	**desired darkness setting (2-digit number)** *Accepted Values:* 00 to 30 *Default Value:* last permanently saved value

Comments: The ^MD command value, if applicable, is added to the ~SD command.

^SE

Select Encoding

Description: The ^SE command has been created to select the desired ZPL or ZPL II encoding table.

Format: ^SEn

Parameters:

n	=	**name of encoding table** *Accepted Values:* R:, B:, E: *Default Value:* R:

^SF

Serialization Field (with a Standard ^FD String)

Description: The ^SF command allows the user to serialize a standard ^FD string. Fields serialized with this command will be right justified or would end with the last character of the string. The increment string is aligned with the mask starting with the right-most position. The maximum size of the mask and increment string is 3K combined.

Format: ^SFa,b

Parameters:

a = mask string
The mask string sets the serialization scheme. The length of the string mask defines the number of characters in the current ^FD string to be serialized. The mask is aligned to the characters in the ^FD string starting with the right-most position.
Mask String placeholders:
D or d - Decimal numeric 0-9
H or h - Hexadecimal 0-9 plus a-f or A-F
O or o - Octal 0-7
A or a - Alphabetic a-z or A-Z
N or n - Alphanumeric 0-9 plus a-z or A-Z
% - Ignore character or skip

b = increment string
The increment string is the value to be added to the field on each label. The default value is equivalent to a decimal value of one. The string is composed of any characters defined in the serial string. Invalid characters will be assumed to be equal to a value of zero in that character position.

The increment value for alphabetic strings will start with ‘A’ or ‘a’ as the zero place holder. This means to increment an alphabetic character by one a value of ‘B’ or ‘b’ must be in the increment string.

For characters that do not get incremented, the “%” character needs to be added to the increment string.

Example:

```
^FD12A^SFnnA,C
```

This mask has the first characters as alphanumeric (nn = 12) and the last digit as upper case alphabetic (A). The decimal value of the increment number is equivalent to 2 (C).

The print sequence on a series of labels would be:
12A, 12C, 12E, 12G...

```
^FDBL0000^SFAAdddd,1
```

The print sequence on a series of labels would be:
BL0000, BL0001,...BL0009, BL0010,...
BL0099, BL0100,...BL9999, BM0000...

```
^FDBL00-0^SFAAdd%d,1%1
```

The print sequence on a series of labels would be:
BL00-0, BL01-1, BL02-2,...BL09-9,
BL11-0, BL12-1...

^SL

Set Mode/Language (for Real Time Clock)

Description: The ^SL command is used to specify the Real Time Clock's mode of operation and language for printing information.

Format: ^SLa,b

Parameters:

a = mode

Accepted Values:

S = "Start Time" mode. This is the time that is read from the real time clock when label formatting begins (when ^XA is received). The first label will have the same time placed on it as the last label.

T = "Time Now" mode. This is the time that is read from the real time clock when the label to be printed is placed in queue to be printed. Time now is similar to a serialized time or date field.

Default Value: S

b = language

Accepted Values:

1 = English
2 = Spanish
3 = French
4 = German
5 = Italian
6 = Norwegian
7 = Portuguese
8 = Swedish
9 = Danish
10 = Spanish 2
11 = Dutch
12 = Finnish

Default Value: the language selected with ^KL or the front panel

^SN

Serialization Data

Description: The ^SN command allows the printer to index data fields by a selected increment or decrement value (i.e., make the data fields increase or decrease by a specified value) each time a label is printed. This can be performed on up to 100 to 150 fields in a given format and can be performed on both alphanumeric and bar code fields. A maximum of 12 of the rightmost integers are subject to indexing. The first integer found when scanning from right to left starts the indexing portion of the data field.

If the alphanumeric field to be indexed ends with an alpha character, the data will be scanned, character-by-character, from right to left until a numeric character is encountered. Serialization will take place using the value of the first number found.

Format: ^SNv,n,z

Parameters:

v = starting value
Accepted Values: up to 12 digits for the portion to be indexed.
Default Value: 1

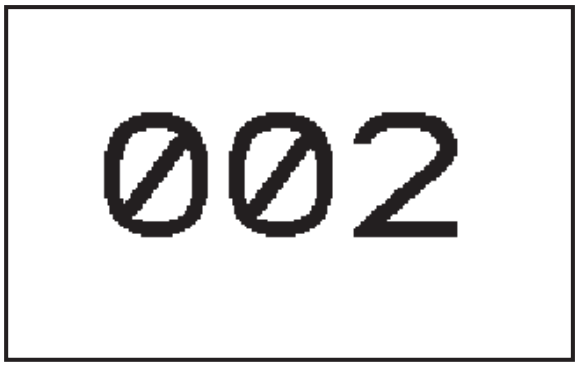
n = increment/decrement value
Accepted Values: 12-digit maximum
Default Value: 1

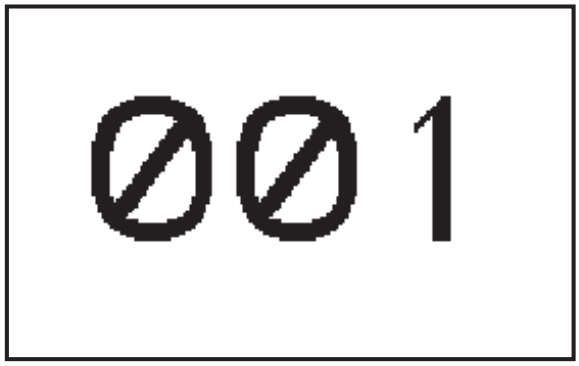
To indicate a decrement value, precede the value with a minus sign (-).

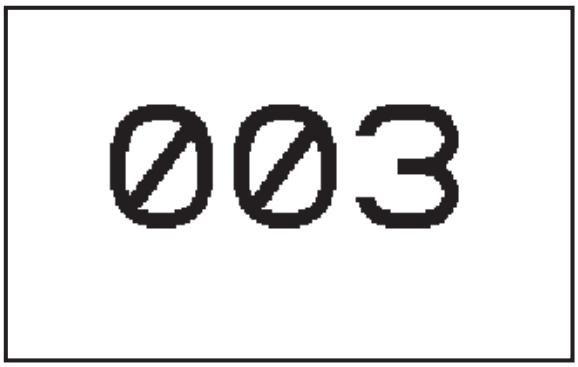
z = add leading zeros (if needed)
Accepted Values: Y (yes) or N (no)
Default Value: N

Example:

```
^XA
^FO260,110^CFG^SN001,1,Y^FS
^PQ3^FS
^XZ
```







Comments: Incrementing and decrementing takes place for each serial-numbered field when all replicates for each serial number have been printed, as specified in parameter *r* of the ^PQ (print quality) command.

If, during the course of printing serialized labels the printer runs out of either paper or ribbon, the first label printed (after the media or ribbon has been replaced and calibration completed) will have the same serial number as the “partial” label printed before the “out” condition occurred. This is done in case the last label before the “out” condition did not fully print. This is controlled by the ^JZ command.

Using Leading Zeros

In the ^SN command, the *z* parameter determines if leading zeros will be printed or suppressed. The default value for this parameter is to not print the leading zeros. Depending on which value is used (Y = Yes, print leading zeros; N = No, do not print leading zeros) the printer will either print or suppress the leading zeros.

Print Leading Zeros

The starting value consists of the right most consecutive sequence of digits. The width (number of digits in the sequence) is determined by scanning from right to left until the first non-digit (space or alpha character) is encountered. To create a specific width, manually place leading zeros as necessary.

Suppressing Leading Zeros

The starting value consists of the right-most consecutive sequence of digits, including any leading spaces. The width (number of digits in the sequence) is determined by scanning from right to left until the first alpha character (except a space) is encountered. To create a specific width, manually place leading spaces or zeros as necessary. Suppressed zeros are replaced by spaces. During the serialization process, when the entire number contains all zeros, the last zero is not suppressed. In this case a single zero is printed.

The ^SN command replaces the Field Data (^FD) command within a label formatting program.

^SO

Set Offset (for Real Time Clock)

Description: The ^SO command is used to set the secondary and the tertiary offset from the primary Real Time Clock.

Format: ^SO

Parameters:

a = clock set
Accepted Values: 2 (secondary) or 3 (tertiary)
Default Value: value must be specified

b = months offset
Accepted Values: -32000 to 32000
Default Value: 0

c = days offset
Accepted Values: -32000 to 32000
Default Value: 0

d = years offset
Accepted Values: -32000 to 32000
Default Value: 0

e = hours offset
Accepted Values: -32000 to 32000
Default Value: 0

f = minutes offset
Accepted Values: -32000 to 32000
Default Value: 0

g = seconds offset
Accepted Values: -32000 to 32000
Default Value: 0

^SP

Start Print

Description: The ^SP command allows a label to start printing at a specified point before the entire label has been completely formatted. On extremely complex labels, this command can increase the overall throughput of the print.

The command works as follows.

You specify the dot row at which the ^SP command is to take affect. This then creates a label "segment." Once the ^SP command is processed, all information in that segment will be printed. During the printing process, all of the commands after the ^SP will continue to be received and processed by the printer.

If the segment after the ^SP command (or the remainder of the label) is ready for printing, media motion does not stop. If the next segment is not ready, the printer will stop mid-label and wait for the next segment to be completed. Precise positioning of the ^SP command requires a trial-and-error process, as it depends primarily on print speed and label complexity.

The ^SP command can be effectively used to determine the worst possible print quality. You can determine if using the ^SP command is appropriate for the particular application by using the following procedure.

If you send the label format up to the first ^SP command and then wait for printing to stop before sending the next segment, the printed label will be a sample of the worst possible print quality. It will also drop any field that is out of order.

If the procedure above is used, the end of the label format must be:

```
^SP#^FS
```

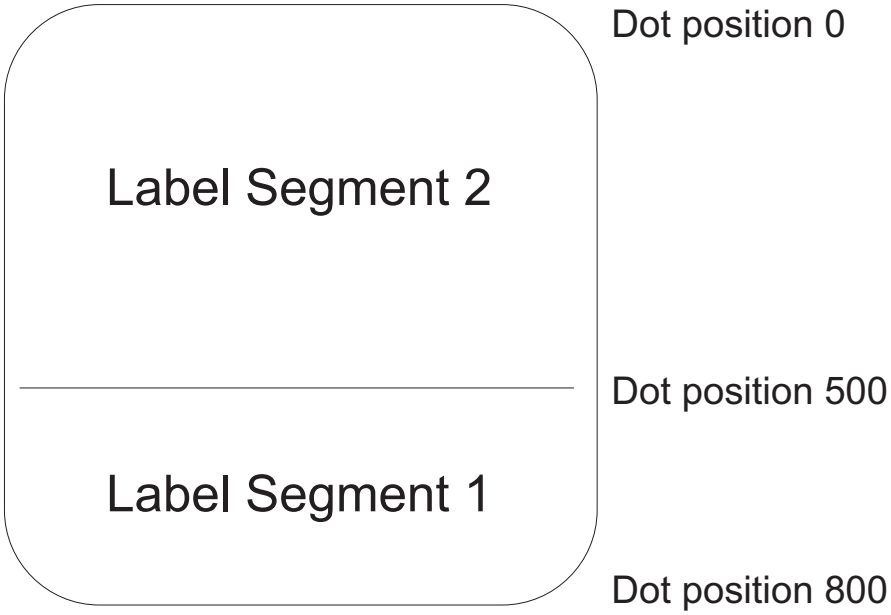
Format: ^SPa

Parameters:

a = dot row to start printing
Accepted Values: 0 to 32000
Default Value: 0

Example:

In the following illustration, a label 800 dot rows in length has a ^SP500 command. Segment 1 will print while commands in Segment 2 are being received and formatted.



^SQ

Halt ZebraNet ALERT

Description: The ^SQ command is used to stop the ZebraNet ALERT option.

Format: ^SQa,b,c

Parameters:

a = condition A through Q or *
Accepted Values:
A = paper out
B = ribbon out
C = printhead over-temp
D = printhead under-temp
E = head open
F = power supply over temp
G = ribbon-in warning (direct thermal mode)
H = rewind full
I = defaulted printer
J = cut error
K = printer paused
L = PQ job completed
M = label taken
N = head element out
O = Reserved
P = Reserved
Q = power on
R = all errors
The asterisk (*) can be used as a wildcard to stop alerts for all conditions.

b = destination A through Q or *
Accepted Values:
A = serial port
B = parallel port
C = e-mail address
D = TCP/IP
E = UDP/IP
F = SNMP trap
The asterisk (*) can be used as a wildcard to stop alerts for all destinations.

c = halt messages
Accepted Values: Y (halt messages) or N (start messages)
Default Value: Y

^SR

Set Printhead Resistance

Description: The ^SR command allows you set the printhead resistance.

Format: ^SR#

Parameters:

#	=	**resistance value (4-digit numeric value)** *Accepted Value:* 488 to 1175 *Default Value:* last permanently saved value

Comments: To avoid damaging the printhead, this value should be less than or equal to the value shown on the printhead being used. Setting a higher value may damage the printhead.

^SS

Set Media Sensors

Description: The ^SS command is used to change the values for media, web, ribbon and label length set during the media calibration process. The media calibration process is described in your specific printer's user's guide.

Format: ^SSw,m,r,l,m2,r2,a,b,c

Parameters:

w = **web (3-digit value)**
Accepted Values: 000 to 100
Default Value: The value shown on the media sensor profile or configuration label.

m = **media (3-digit value)**
Accepted Values: 000 to 100
Default Value: The value shown on the media sensor profile or configuration label.

r = **ribbon (3-digit value)**
Accepted Values: 001 to 100
Default Value: The value shown on the media sensor profile or configuration label.

l = **label length (in dots, 4-digit value)**
Accepted Values: 0001 to 32000
Default Value: The value calculated in the calibration process.

m2 = **intensity of media LED (3-digit value)**
Accepted Values: 000 to 100
Default Value: The value calculated in the calibration process.

r2 = **intensity of ribbon LED**
Accepted Values: 000 to 100
Default Value: The value calculated in the calibration process.

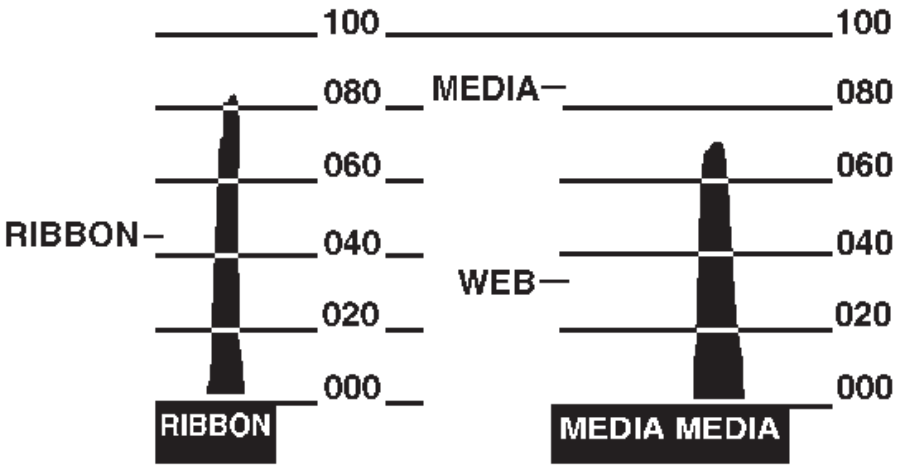
a = mark sensing (3-digit value)
Accepted Values: 000 to 100
Default Value: The value calculated in the calibration process.

b = mark media sensing (3-digit value)
Accepted Values: 000 to 100
Default Value: The value calculated in the calibration process.

c = mark LED sensing (3-digit value)
Accepted Values: 000 to 100
Default Value: The value calculated in the calibration process.

Example:

In the illustration below is an example of a media sensor profile. Notice the numbers from 000 to 100 and where the words WEB, MEDIA and RIBBON appear in relation to those numbers. Also notice the black vertical spike. This represents where the printer sensed the transition from media-to-web-to-media.



The media and sensor profiles produced will vary in appearance from printer to printer.

Comments: The *m2* and *r2* parameters have no effect in Stripe® printers.

Maximum values for parameters will depend on which printer platform is being used.

^ST

Set Time/Date (for Real Time Clock)

Description: The ^ST command sets the time and date of the Real Time Clock.

Format: ^STa,b,c,d,e,f,g

Parameters:

a = month
Accepted Values: 01 to 12
Default Value: current month

b = day
Accepted Values: 01 to 31
Default Value: current day

c = year
Accepted Values: 1998 to 2097
Default Value: current year

d = hour
Accepted Values: 00 to 23
Default Value: current hour

e = minute
Accepted Values: 00 to 59
Default Value: current minute

f = second
Accepted Values: 00 to 59
Default Value: current second

g = format
Accepted Values:
A = a.m.
P = p.m.
M = 24-hour military
Default Value: M

^SX

Set ZebraNet ALERT

Description: The ^SX command is used to configure the ZebraNet ALERT system.

Format:^SXa,b,c,d,e,f

Parameters:

a = condition type

Accepted Values:

A = paper out
B = ribbon out
C = printhead over-temp
D = printhead under-temp
E = head open
F = power supply over temp
G = ribbon-in warning (direct thermal mode)
H = rewind full
I = defaulted printer
J = cut error
K = printer paused
L = PQ job completed
M = label taken
N = head element out
O = Reserved
P = Reserved
Q = power on
R = all errors

Default Value: If this parameter is missing or invalid, the command will be ignored.

b = destination to route alert to (A through F)

Accepted Values:

A = serial port
B = parallel port
C = e-mail address
D = TCP/IP
E = UDP/IP
F = SNMP trap

Default Value: If this parameter is missing or invalid, the command will be ignored.

c = enable "condition set" alert to this destination
Accepted Values: Y (yes) or N (no)
Default Value: Y or previously configured value

d = enable "condition clear" alert to this destination
Accepted Values: Y (yes) or N (no)
Default Value: N or previously configured value

Parameters *e* and *f* are sub-options based on destination. If the sub-options are missing or invalid, these parameters will be ignored.

e = destination setting
Accepted Values:
Internet e-mail address (e.g. user@company.com)
IP address (e.g. 10.1.2.123)
SNMP trap
IP or IPX addresses

f = port number
Accepted Values:
TCP port # (0 to 65535)
UPD port # (0 to 65535)

Examples:

Serial: ^SXA,A,Y,Y

Parallel: ^SXA,B,Y,Y

E-Mail: ^SXA,C,Y,Y,admin@company.com

TCP: ^SXA,D,Y,Y,123.45.67.89,1234

UDP: ^SXA,E,Y,Y,123.45.67.89,1234

SNMP Trap: ^SXA,F,Y,Y,255.255.255.255

Comments: In the example above for SNMP Trap, entering 255.255.255.255 will broadcast the notification to every SNMP manager on the network. To route the device to a single SNMP manager, a specific address can be entered (123.45.67.89).

^SZ

Set ZPL

Description: The ^SZ command is used to select the programming language used by the printer. This command gives you the ability to print labels formatted in both ZPL or ZPL II.

This command will remain active until another ^SZ command is sent to the printer or the printer is turned off.

Format:^SZa

Parameters:

a = ZPL version
Accepted Values:
1 = ZPL
2 = ZPL II
Default Value: 2

Comments: If the parameter is missing or invalid, the command will be ignored.

~TA

Tear-off Adjust Position

Description: The ~TA command lets you adjust the rest position of the media after a label is printed, which changes the position at which the label is torn or cut.

Format: ~TA###

Parameters:

###	=	**change in media rest position (3-digit value in dot rows)** *Accepted Values:* -120 to 120 *Default Value:* last permanent value saved

Comments: If the parameter is missing or invalid, the command is ignored.

^TO

Transfer Object

Description: The ^TO command is used to copy an object or group of objects from one storage device to another. It is quite similar to the copy function used in PC's.

Source and destination devices must be supplied and must be different and valid for the action specified. Invalid parameters will cause the command to be ignored.

There are no defaults associated with this command. However, the asterisk (*) may be used as a wild card for object names and extensions. For instance, ZEBRA.* or *.GRF would be acceptable forms for use with ^TO command.

Format: ^TOd:o.x,s:o.x

Parameters:

d = source device of stored object
Accepted Values: R: or B:

o = stored object name
Accepted Values: any existing object conforming to Zebra conventions.

x = object extension
Accepted Values: any extension conforming to Zebra conventions.

s = destination device of the stored object
Accepted Values: R: or B:

o = name of the object at destination
Accepted Values: up to 8 alphanumeric characters
Default Value: If no name is entered, UNKNOWN is used.

x = object extension
Accepted Values: any extension conforming to Zebra conventions.

Comments: Parameters *o*, *x*, and *s* support the use of the wild card (*).

If the destination device does not have enough free space to store the object being copied, the command will be abandon.

Zebra files (Z:*.*) cannot be transferred. These files are copyrighted by Zebra Technologies Corporation.

Transferring Objects

The following are some examples of using the ^TO command. To copy the object ZLOGO.GRF from DRAM to an optional Memory Card and rename it ZLOGO1.GRF:

```
^XA
^TOR:ZLOGO.GRF,B:ZLOGO1.GRF
^XZ
```

To copy the object SAMPLE.GRF from an optional Memory Card to DRAM and keep the same name:

```
^XA
^TOB:SAMPLE.GRF,R:SAMPLE.GRF
^XZ
```

Transferring Multiple Objects

The asterisk (*) can be used to transfer multiple object files (except *.FNT) from the DRAM to the Memory Card. For example, you have several object files that contain logos. These files are named LOGO1.GRF, LOGO2.GRF, and LOGO3.GRF.

For example, if you wanted to transfer all these files to the memory card using the name NEW instead of LOGO, an asterisk would be placed after the names NEW and LOGO in the transfer command. This would copy all files beginning with LOGO in one command.

```
^XA
^TOR:LOGO*.GRF,B:NEW*.GRF
^XZ
```

During a multiple transfer, if a file is too big to be stored on the memory card, that file will be skipped. All remaining files will attempt to be transferred. All files that can be stored within the space limitations will be transferred. Other files will be ignored.

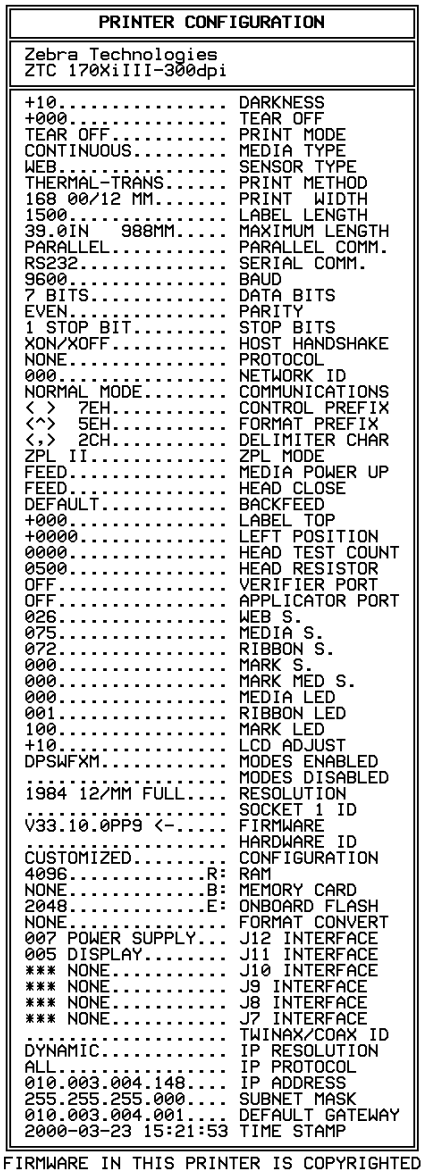
~WC

Print Configuration Label

Description: The ~WC command is used to generate a printer configuration label The printer configuration label contains information about the printer set up, such as sensor type, network ID, ZPL mode, firmware version, and descriptive data on the R:, B: and E: devices.

Format: ~WC

Comments: This command only works when the printer is idle.



```
PRINTER CONFIGURATION

Zebra Technologies
ZTC 170XiIII-300dpi

+10.................. DARKNESS
+000................. TEAR OFF
TEAR OFF............. PRINT MODE
CONTINUOUS........... MEDIA TYPE
WEB.................. SENSOR TYPE
THERMAL-TRANS........ PRINT METHOD
168 00/12 MM........ PRINT  WIDTH
1500................. LABEL LENGTH
39.0IN   988MM...... MAXIMUM LENGTH
PARALLEL............. PARALLEL COMM.
RS232................ SERIAL COMM.
9600................. BAUD
7 BITS............... DATA BITS
EVEN................. PARITY
1 STOP BIT........... STOP BITS
XON/XOFF............. HOST HANDSHAKE
NONE................. PROTOCOL
000.................. NETWORK ID
NORMAL MODE.......... COMMUNICATIONS
< >  7EH............ CONTROL PREFIX
<^>  5EH............ FORMAT PREFIX
<,>  2CH............ DELIMITER CHAR
ZPL II............... ZPL MODE
FEED................. MEDIA POWER UP
FEED................. HEAD CLOSE
DEFAULT.............. BACKFEED
+000................. LABEL TOP
+0000................ LEFT POSITION
0000................. HEAD TEST COUNT
0500................. HEAD RESISTOR
OFF.................. VERIFIER PORT
OFF.................. APPLICATOR PORT
026.................. WEB S.
075.................. MEDIA S.
072.................. RIBBON S.
000.................. MARK S.
000.................. MARK MED S.
000.................. MEDIA LED
001.................. RIBBON LED
100.................. MARK LED
+10.................. LCD ADJUST
DPSWFXM.............. MODES ENABLED
...................  MODES DISABLED
1984 12/MM FULL..... RESOLUTION
...................  SOCKET 1 ID
V33.10.0PP9 <-...... FIRMWARE
...................  HARDWARE ID
CUSTOMIZED.......... CONFIGURATION
4096..............R: RAM
NONE..............B: MEMORY CARD
2048..............E: ONBOARD FLASH
NONE................. FORMAT CONVERT
007 POWER SUPPLY.... J12 INTERFACE
005 DISPLAY......... J11 INTERFACE
*** NONE............ J10 INTERFACE
*** NONE............ J9 INTERFACE
*** NONE............ J8 INTERFACE
*** NONE............ J7 INTERFACE
...................  TWINAX/COAX ID
DYNAMIC.............. IP RESOLUTION
ALL.................. IP PROTOCOL
010.003.004.148..... IP ADDRESS
255.255.255.000..... SUBNET MASK
010.003.004.001..... DEFAULT GATEWAY
2000-03-23 15:21:53 TIME STAMP

FIRMWARE IN THIS PRINTER IS COPYRIGHTED
```

^WD

Print Directory Label

Description: The ^WD command is used to print a label listing bar codes, objects stored in DRAM, or fonts.

For bar codes, the list will show the name of the bar code. For fonts, the list shows the name of the font, number to use with ^Af command, and size. For objects stored in DRAM, the list shows the name of the object, extension, size and option flags. All lists are enclosed in a double line box.

Format: ~WDd:o.x

Parameters:

d = source device – optional
Accepted Values: E:, B:, R: and Z:
Default Value: R:

o = object name – optional
Accepted Values: any name up to 8 characters.
Default Value: * (asterisk). A ? (question mark) is also allowed.

x = object extension – optional
Accepted Values: any extension conforming to Zebra conventions.
Default Value: * (asterisk). A ? (question mark) is also allowed.

Example:

To print a label listing all objects in DRAM, enter:

```
^XA
^WDR:*.*
^XZ
```

To print a label listing all the bar codes.

```
^XA
^WDZ:*.BAR
^XZ
```

To print a label listing all fonts.

```
^XA
^WDE:
^XZ
```

^XA

Start Format

Description: The ^XA command is used at the beginning of ZPL II code. It is the opening bracket and indicates the start of a new label format. This command is substituted with a single ASCII control character STX (control-B, Hexadecimal 02).

Format: ^XZ

Comments: Label formats should start with the ^XA command and end with the ^XZ command to be in valid ^ZPL format.

^XB

Suppress Backfeed

Description: The ^XB command suppresses forward feed of media to tear-off position depending on the current printer mode. Since no forward feed is done, a backfeed before printing of the next label is not necessary, therefore, throughput will be improved. When printing a batch of labels, the last label should not contain this command.

Format: ^XB

^XB in the Tear-off Mode

Normal operation: backfeed, print, and feed to rest.
^XB operation: print (rewind mode).

^XB in the Peel-off Mode

Normal operation: backfeed, print, and feed to rest.
^XB operation: print (rewind mode).

^XF

Recall Format

Description: The ^XF command recalls a stored format to be merged with variable data. There can be multiple ^XF commands and they can be located anywhere in the label format.

When recalling a stored format and merging data utilizing the ^FN (Field Number) function, the calling format must contain the ^FN command to properly merge the data.

While use of stored formats will reduce transmission time, no formatting time is saved since the ZPL II format being recalled was saved as text strings which need to be formatted at print time.

Format: ^XFd:o.x

Parameters:

d = source device of stored image
Accepted Values: up to 8 alphanumeric characters
Default Value: search priority (R:, B:, E:, Z:)

o = name of stored image
Accepted Values: up to 8 alphanumeric characters
Default Value: UNKNOWN

x = image extension
Fixed Value: .ZPL

Example:

The following is an example of using the ^XF command to recall the format STOREFMT.ZPL from DRAM and also send new reference data:

```
^XA
^XFR:STOREFMT.ZPL^FS
^FN1^FDZEBRA^FS
^FN2^FDPRINTER^FS
^XZ
```

^XG

Recall Graphic

Description: The ^XG command is used to recall one or more graphic images for printing. This command is used in a label format to merge pictures such as company logos and piece parts, with text data to form a complete label.

An image may be recalled and resized as many times per format as needed. Other images and data may be added to the format.

Format:^XGd:o.x,mx,my

Parameters:

d = source device of stored image
Accepted Values: up to 8 alphanumeric characters
Default Value: search priority (R:, B:, E:, Z:)

o = name of stored image
Accepted Values: up to 8 alphanumeric characters
Default Value: UNKNOWN

x = image extension
Fixed Value: .GRF

mx = magnification factor on the x-axis
Accepted Values: 1 to 10
Default Value: 1

my = magnification factor on the y-axis
Accepted Values: 1 to 10
Default Value: 1

Example: The following is an example of using the ^XG command to recall the image SAMPLE.GRF from DRAM and print it in 5 different locations and 5 different sizes on the same label:

```
^XA
^FO100,100^XGR:SAMPLE.GRF,1,1^FS
^FO100,200^XGR:SAMPLE.GRF,2,2^FS
^FO 100,300^XGR:SAMPLE.GRF,3,3^FS
^FO100,400^XGR:SAMPLE.GRF,4,4^FS
^FO100,500^XG R:SAMPLE.GRF,5,5^FS
^XZ
```

^XZ

End Format

Description: The ^XZ command is the ending (closing) bracket. It indicates the end of a label format. When this command is received, a label will be printed. This command can also be issued as a single ASCII control character ETX (Control-C, Hex 03).

Format: ^XZ

Comments: Label formats must start with the ^XA command and end with the ^XZ command to be in valid ZPL II format.

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